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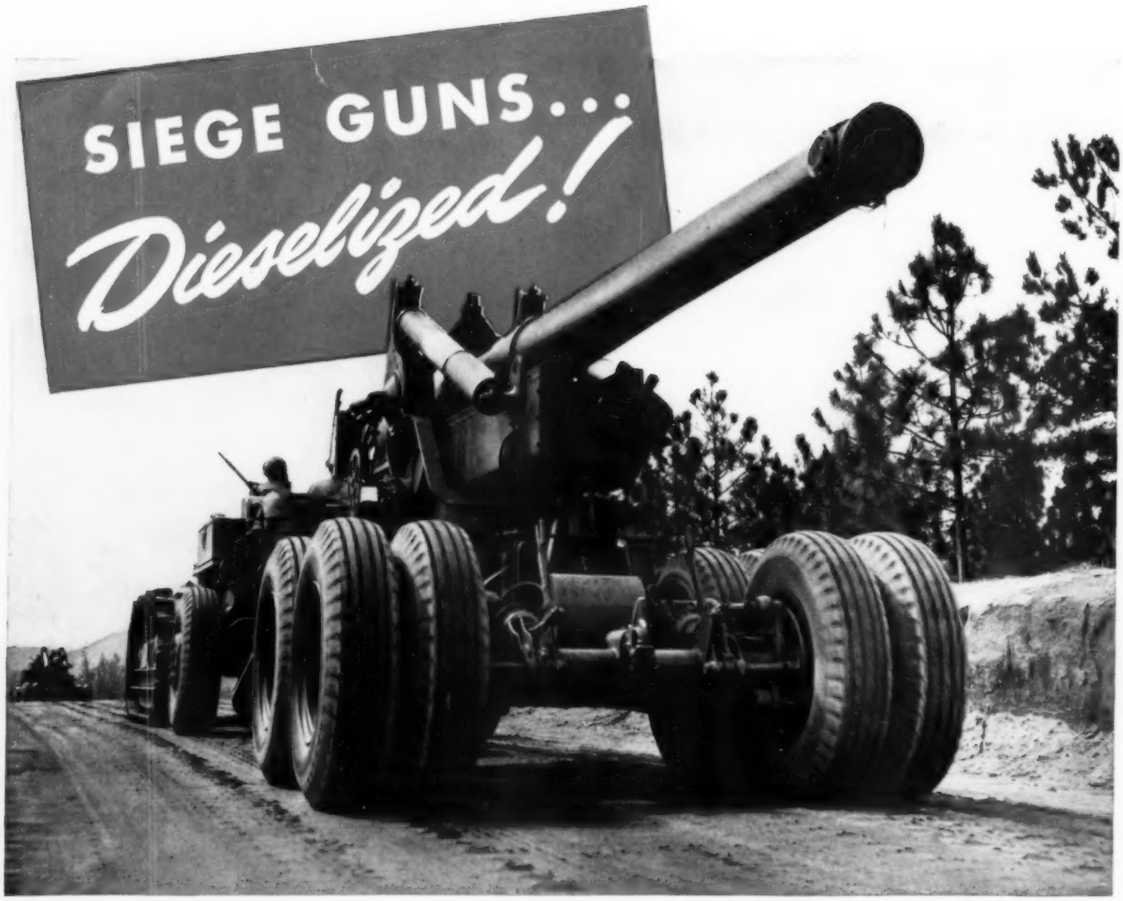

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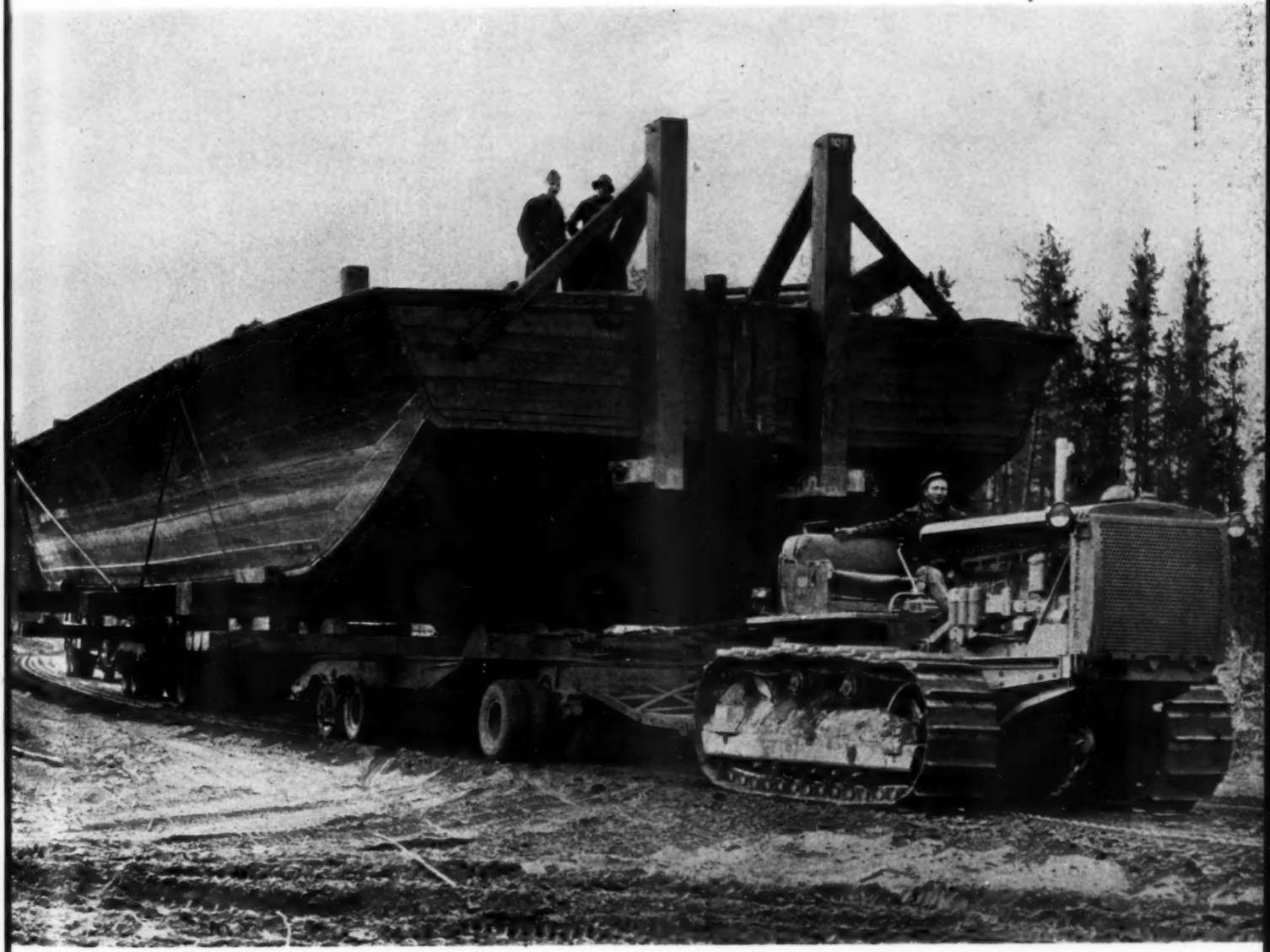

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FRONT COVER ILLUSTRATION: The Chilean Navy Auxiliary training vessel *Lautaro,* powered with two Atlas Imperial Diesel main engines, and two Reiner Diesel generating units.

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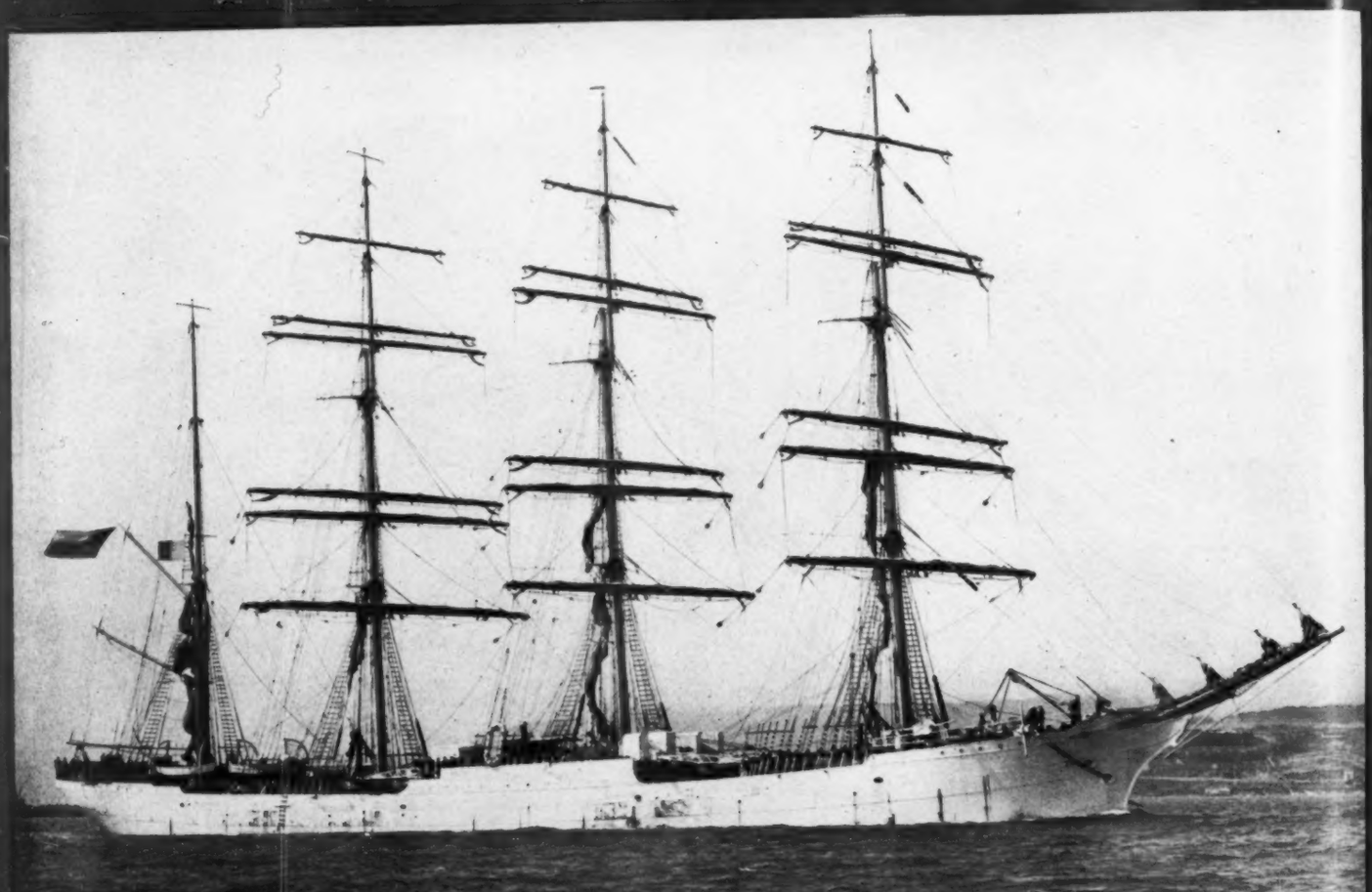
THE CHILEAN NAVY DIESEL AUXILIARY BARKENTINE



LAUTARO

By WILL H. FULLERTON

OF the many interesting installations made by the Atlas Imperial Diesel Engine Co., the recently accepted installation in the Chilean naval vessel *Lautaro* is, because of the background and color surrounding it, one of the most outstanding.

The *Lautaro* is a four-masted barkentine of 3,185 gross tons, and was formerly the German ship *Priwall*. She is a steel vessel, and was built by the German shipyards of Messrs. Blohm & Voss, at Hamburg in 1919. Originally, she belonged to the Laeisz Line of Hamburg, who operated what was internationally known as the line of the "Flying P's." They were given this nickname because all their ships had a name beginning with the letter "P" and, secondly, because the ships were extremely fast. It is interesting to note in this connection that on the voyage from Chile to San Francisco under sail alone, the *Lautaro* at times logged 15 knots. This is quite remarkable when it is considered that the ship is 325 feet in length by 47 feet beam, and of the tonnage as per

viously stated.

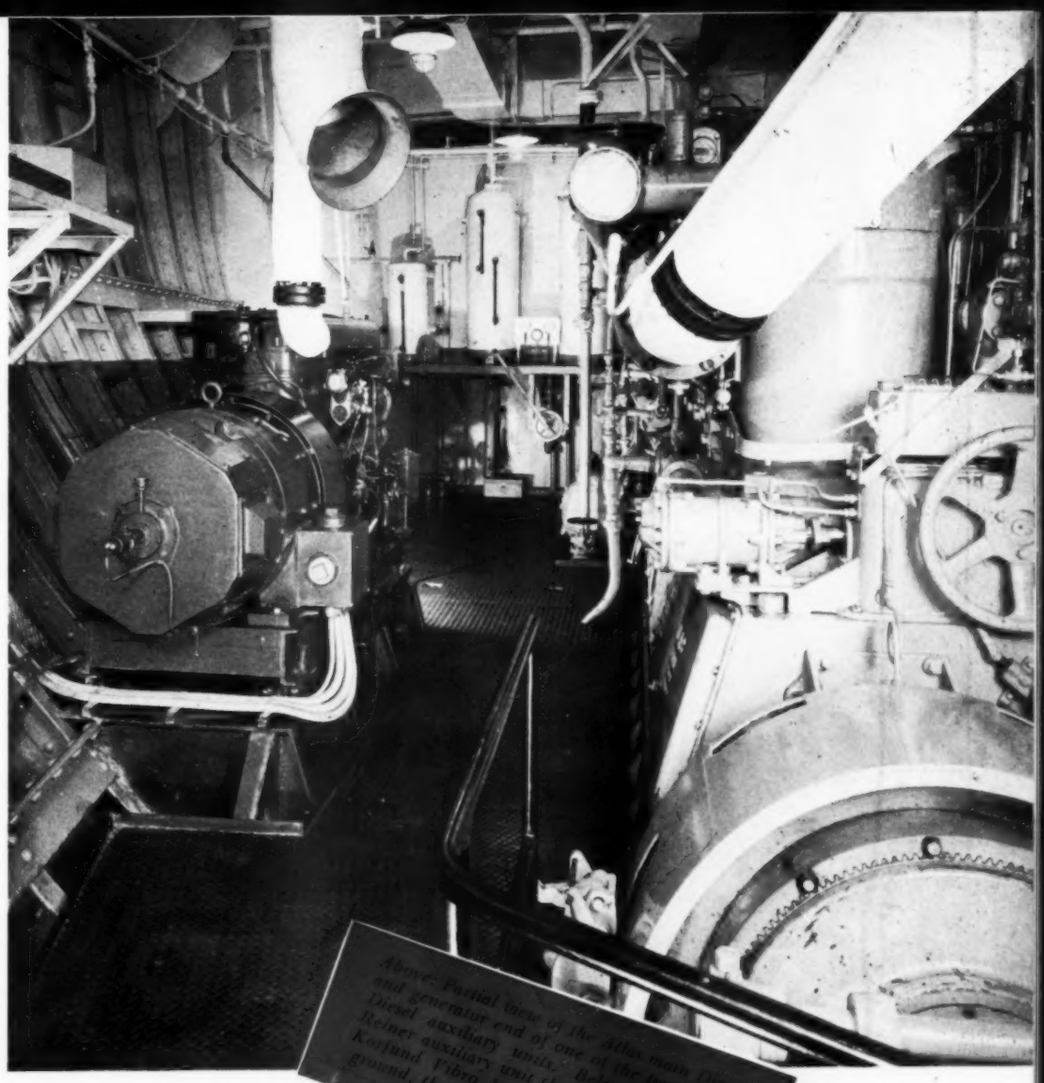
The Laeisz Line operated the vessel in the nitrate trade from Chile to continental ports of Europe, and when the present world war started the ship was lying in a Chilean port. Subsequently, it came into the possession of the Chilean Admiralty, who decided to convert her into a training ship for their Naval Academy graduates.

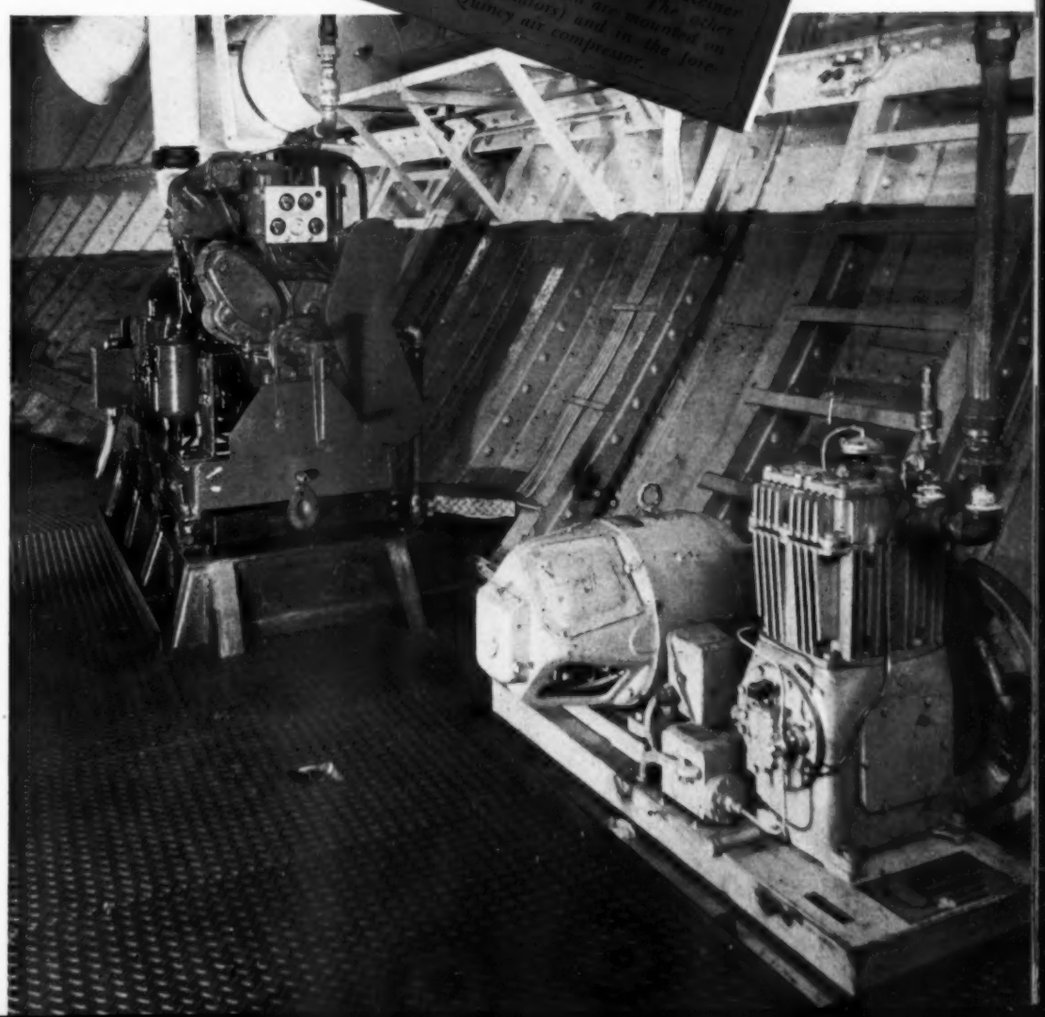
The Chilean Navy, while exceeded in the number of its vessels by another South American country, is, nevertheless, considered outstanding among the South American Navies. The type of ships that it possesses, the thorough training and efficiency of the crews, and above all the careful education and training of Chilean officers gives them first rank in the eyes of those who know. This, of course, is a reflection among other things, of the splendid work accomplished by British Naval missions to Chile during the past several years.

It is also of interest to know that the Chilean Admiralty very definitely considers a man is not a good sailor until he has had experience "before the mast," as from duties on a sailing vessel the young midshipman becomes wise in the way of the sea, develops his "weather eye" and receives benefits of experience which could not otherwise be acquired and which are bound to enhance his seaman-like qualities when finally assigned to a power vessel.

Through the U. S. Government, under its "good neighbor" policy, arrangements were made by the U. S. Navy for the purchase of engines to supply power for the vessel, and, accordingly, a contract was entered into between the U. S. Navy and the Atlas Imperial Diesel Engine Co. in the latter part of 1941.

The ship left Chile sometime in March 1942, and arrived in San Francisco in May, and was taken to the General Engineering & Dry Dock Co. in Alameda for the conversion. In command of the ship was Capt. Arturo Young-Ward, one of the outstanding Captains in the Chilean service. Capt. Young-Ward had hundreds of friends in the U. S., where, some years ago, he was stationed as Chilean Naval Attache at Washington. The Captain, who was formerly in charge of a destroyer flotilla was selected by his Admiralty to bring the *Lautaro* to San Francisco, because of his experience with sailing vessels and his thorough knowledge of their peculiarities. His arrival in California was almost like a return to his own country, as in years past members of the captain's family had





Above—Partial view of the Atlas main Diesel and generator end of one of the two Reiner Diesel auxiliary units. Below—The other Reiner auxiliary unit (both are mounted on Korfund Vibro Isolators) and in the foreground, the Quincy air compressor.

been largely responsible for the establishment of the town of Hayward in Alameda County.

As his Engineer Officer, Capt. Young brought with him Lieut. (s.g.) Kenneth Pearson, one of the outstanding engineer officers of the Chilean submarine service. Both Capt. Young and Lieut. Pearson, together with practically all the officers of their ship, speak excellent English. In fact, the acquirement of a good working knowledge of English is a requirement for graduation from the Chilean Naval Academy.

When it is considered that the *Lautaro* was a merchantman originally, with accommodations for only five officers and thirty men, and that the work on the vessel included the establishment of the proper quarters for twelve officers, 135 sailors and, in addition, accommodations for thirty-six midshipmen, some idea of the immensity of the work involved in converting the vessel may be gained. Under the guidance of Capt. Young and Lieut. Pearson, the ship is now an outstanding example of a real Naval training vessel.

The equipment supplied by the Atlas Imperial Diesel Engine Co. for installation in the *Lautaro* consisted of two 600 hp. direct reversible, marine Diesel engines, respectively with right- and left-hand rotation for twin screw drive. These engines are 15″ bore by 19″ stroke and develop their power at 300 rpm. Both of the engines were built to the inspection requirements of the U. S. Navy. Since the vessel, as previously stated, is a four-masted Barkentine, and the sails will be used for the greater portion of each voyage, the engines were especially equipped with Twin-Disc sailing clutches, operated through a simple ram with air valve control. The purpose of these clutches is to disconnect the shafting and the propeller from the engines when the vessel is running under sail alone, and thus eliminate propeller drag, and permit the wheels to turn freely in the slip stream of the hull.

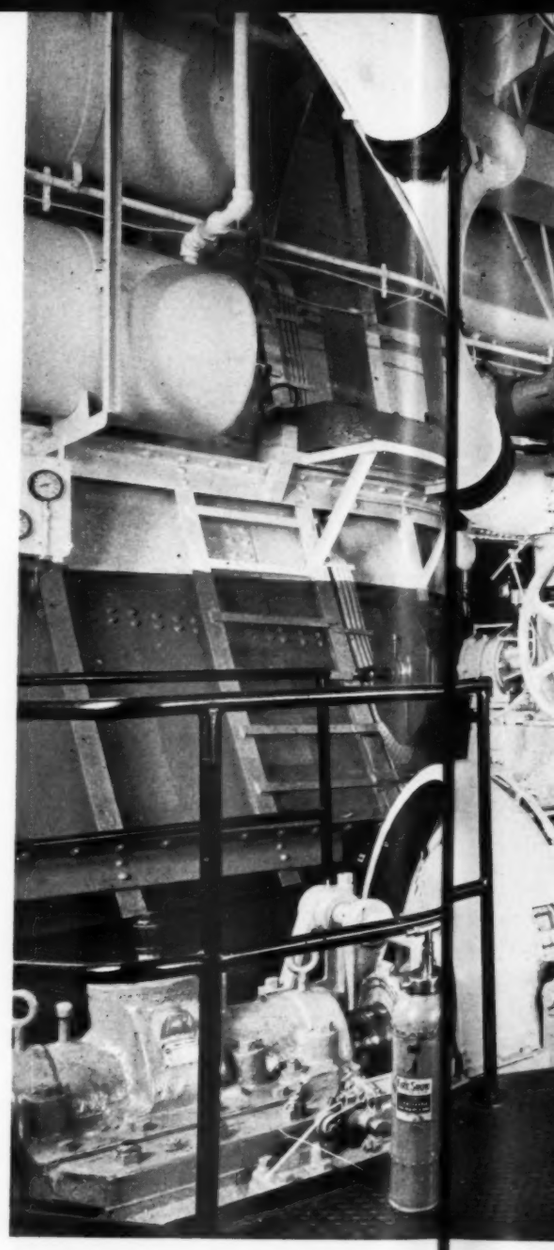
Both engines are maneuvered by the Atlas Imperial "single lever" control. This device controls all functions of the engine from ahead to astern, dead slow to full speed, and proved to be quite a revelation to the Chilean engineering officers, not only from the standpoint of simplicity but from its efficiency of operation as well. The engines are also equipped with Alnor pyrometers and thermocouples, including one additional thermocouple in the common exhaust header. On the gauge board there are Weston Electric tachometers and direction indicators with a set of repeater indicators installed in the cabin of the engineer officer. A Veeder-Root revolution counter is installed on both engines. The thrust bearing supplied on each engine is of the well known Kingsbury type. The engines are further equipped with Bacharach indicator valves and a Bacharach indicator for record purposes, and, of course, thermometers are mounted to indicate temperature conditions of the cooling water in and out, the temperature of the lubricating oil, etc. Both engines are cooled by salt water, directly from the sea, with a recirculation system to maintain the most efficient cooling condition. The engines drive four bladed propellers, designed by the General Engineering and Dry Dock Co., 5′10″ diameter by 4′9″ pitch. Other equipment supplied by the Atlas Imperial Diesel Engine Co. consisted of two Reiner Diesel marine generating sets, of 40 kw., 125 volt, DC capacity. These sets are mounted on Korfund vibration isolators. The entire electrical needs of the vessel are supplied from these auxiliaries.

In the engine room proper other auxiliaries, likewise supplied by Atlas Imperial Diesel Engine Co., consist of one Morris fire pump of the centrifugal type, having 3″ discharge, 4″ suction of the single stage, double suction type, delivering 300 g.p.m. at 100 lb. p.s.i., when running at 1850 rpm. The pump is mounted on a cast iron base and is direct connected to a 35 hp., DC motor through a flexible coupling. The fuel transfer pump is a Viking, capacity 5 g.p.m. at 1200 rpm. and driven by a ½ hp. motor.

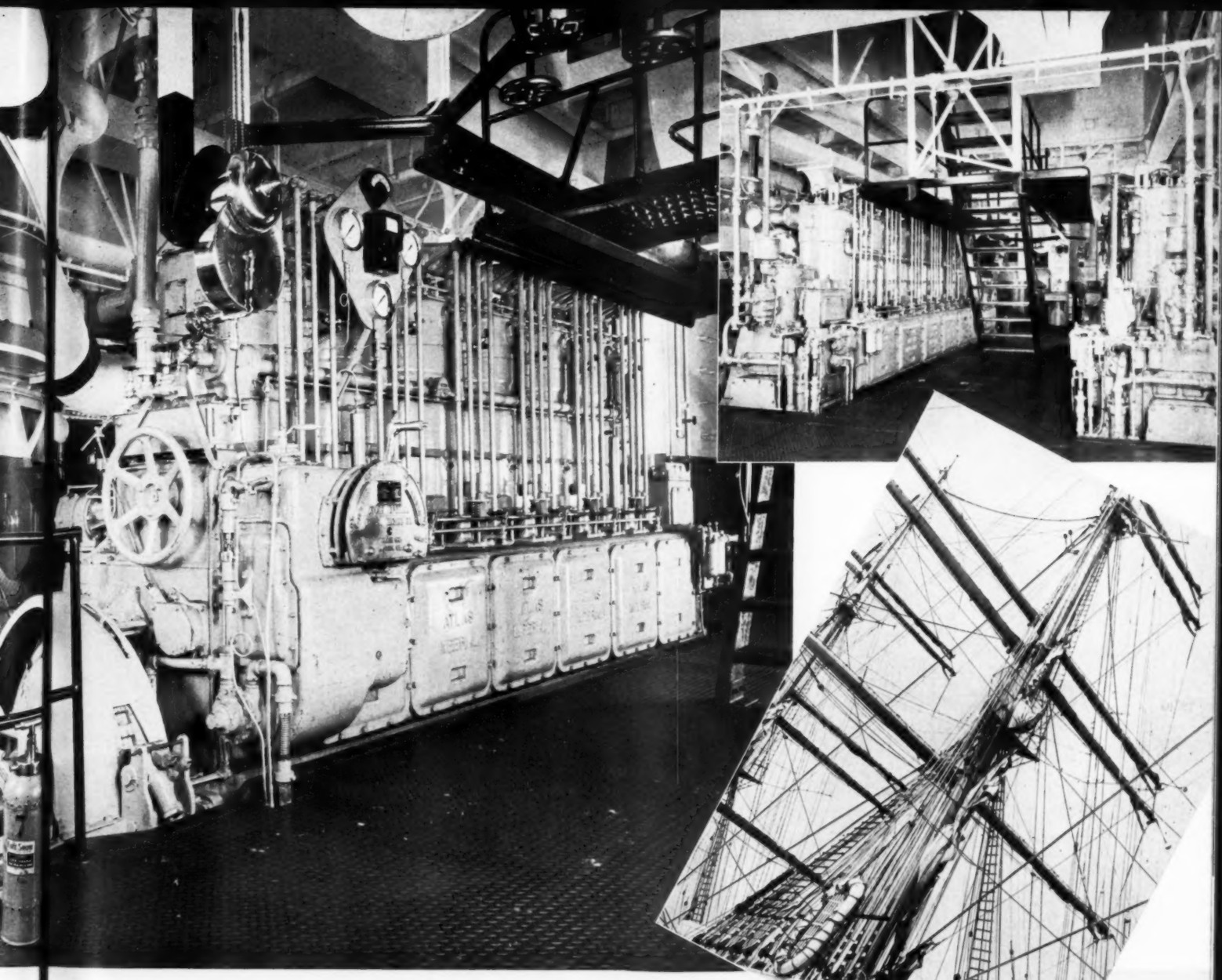
The auxiliary air compressor is a Quincy two stage, air cooled unit with loadless starting and automatic control pressure switch. It is direct connected to a 10 hp., 1750 rpm. motor. All the motors for driving the above units are equipped with special starters of the Cutler-Hammer type.

Electrical operation of the two generating units is controlled from the switchboard, designed for parallel operation, having two sections with ammeter, voltmeter, field rheostat, circuit breaker, main line switch, and ground detector lamps, with reverse ground protection for the circuit breaker. The starting batteries for the auxiliary generator sets are Exide, and each unit is supplied with a tray of four.

All the silencers for the main engines and the auxiliaries are of the Maxim manufacture. The air receivers for the starting air, whistle air, etc., consist of five units, 29½″ diameter by 103″ length, built to American Bureau of Shipping requirements. A small Blackmer, hand-operated transfer pump for the fuel, completes the engine room accessory equipment.



All of the foregoing equipment was installed in the vessel at the plant of and by General Engineering & Dry Dock Co. of Alameda, Calif. Those who have had the privilege of seeing the engine room layout have marveled not only at the spaciousness provided but also at the clean and efficient layout of the interconnecting piping, valves, etc. While each engine is a separate unit in itself, the entire piping layout has been so designed for cross-connection in event



Stern and operating end of the port main Atlas Diesel, a six cylinder, 600 hp. unit. Note Atlas "Single Lever" control, Alnor pyrometer and Weston tachometer.

Top view: View looking aft between the two main Diesels. Right: The Lautaro is also a sailer.

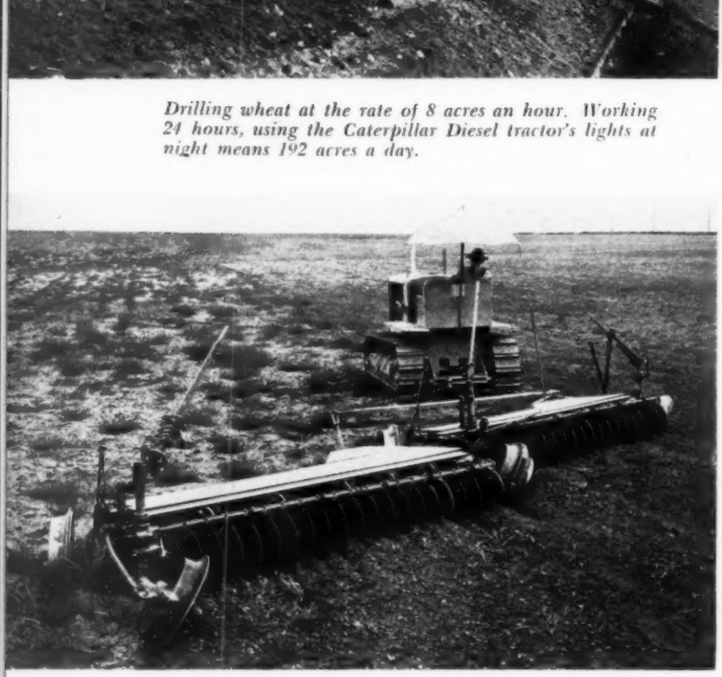
of emergency, so that no occasion may occur when any unit will be forced to stop through lack of fuel oil, air, circulating water, or lube oil, since one half of the entire supply system can be cut off and both engines operate on the other half.

A noteworthy feature of the installation is the type of "seating" installed by the General Engineering and Dry Dock Co., whereby all the propulsion machinery becomes a direct part of the hull. On the trial trip there was no vibration apparent at any time; this lack of vibration being demonstrated by the ability of the engine room force to stand a fountain pen upright on any portion of either engine and have it remain so standing at will. The system of shafting and spring bearings installed in the boat are such as to be immediately accessible for inspection, and to, of course, maintain perfect alignment at all times. The fuel capacity of the vessel is some 92,000 gallons.

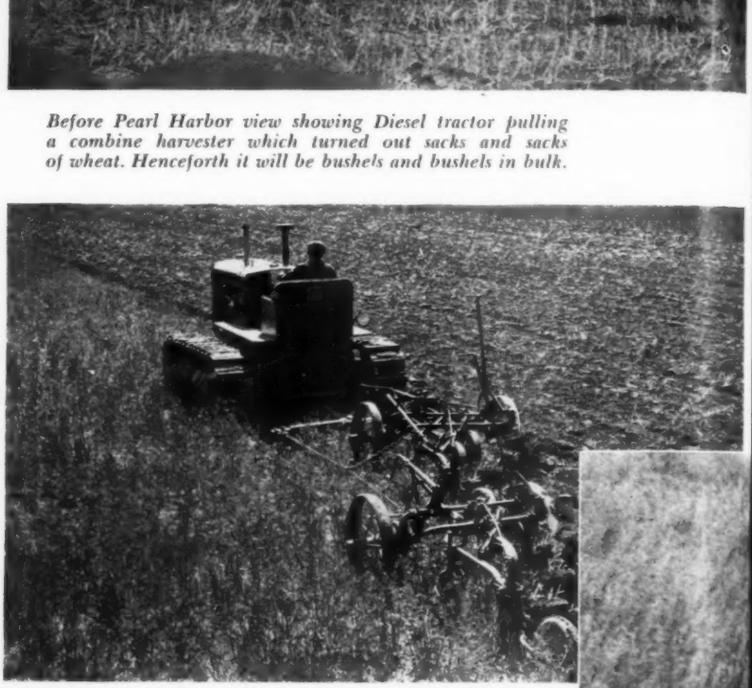
Under present circumstances, it is not possible to give the results of the speed trial. Suffice it to say, however, that the actual speed clocked over a measured course was almost 50% in excess of that estimated by the engineers of both Atlas Imperial Diesel Engine Co. and General Engineering & Dry Dock Co., a truly remarkable picture. While the results of a sea trip, when the vessel finally leaves San Francisco to return to its own country cannot be predicted, enough evidence is on hand to clearly show that such a splendid installation of American products made by American firms will go far, indeed, toward maintaining fine and open relations between our good Chilean neighbors and ourselves with the end of this war.

Drilling wheat at the rate of 8 acres an hour. Working 24 hours, using the Caterpillar Diesel tractor's lights at night means 192 acres a day.

Before Pearl Harbor view showing Diesel tractor pulling a combine harvester which turned out sacks and sacks of wheat. Henceforth it will be bushels and bushels in bulk.



Preparing wheat land in Colorado for 1943 crop. Caterpillar Diesel tractor and pair of disk one-way weeders cover 9½ acres an hour on 2½ gal. of fuel.

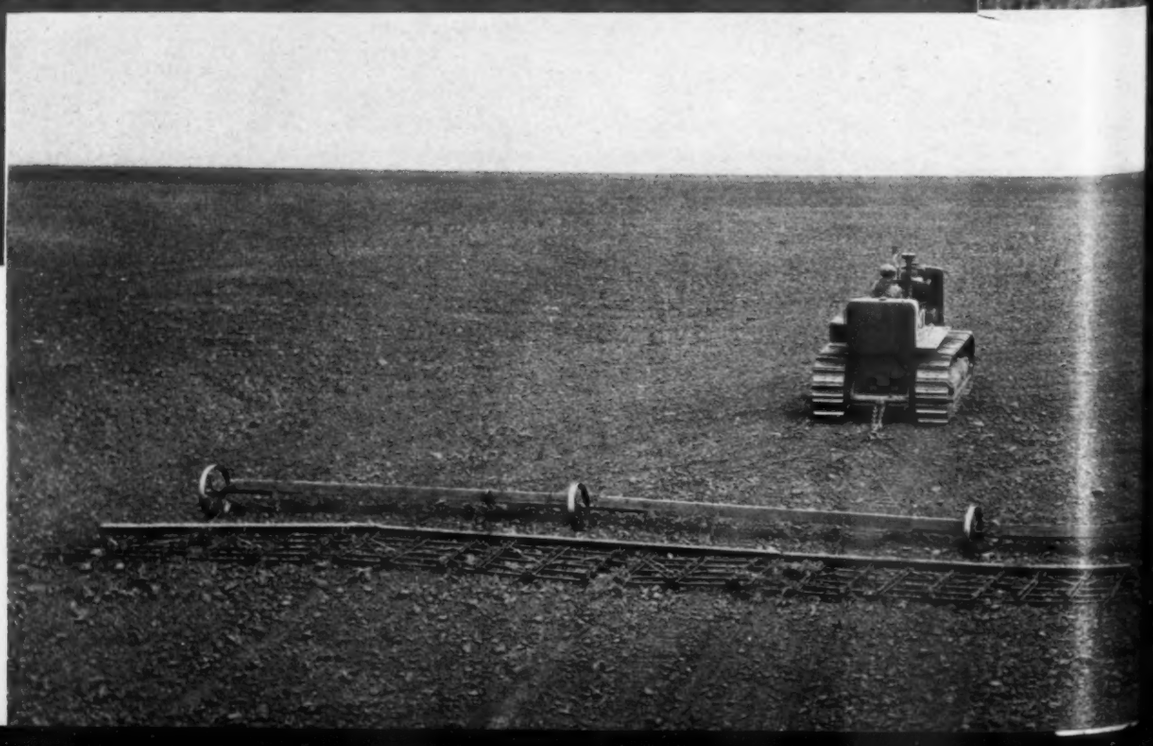


Plowing 1500 acres at rate of 3 acres an hour on 1 gal. of fuel per acre with Caterpillar Diesel tractor and seven 14 in. plows.

DIESEL TRACTORS CUT GRAIN COSTS BEYOND WAR RATIONING

by

F. HAL HIGGINS



Harrowing a lot of ground in Sherman County, Oregon with a Caterpillar Diesel tractor.

ANOTHER year of war will put the U.S. on food rations for about everything but bread, say the authorities. A quarter century ago in World War I, bread got a doctoring up with wheat substitutes to stretch it. But this time "something has been added" to the farming system that produces the wheat, oats, rye and barley. That something is the Diesel and the cutting in half of the cost of such farming fundamentals as plowing, disking, harrowing, seeding, trucking, harvesting, and lighting. Proof? The data from such areas and sources as the Farm Bureau County Agents and tractor dealers up and down the Pacific Coast from the hills of the famous Palouse in eastern Washington to the Mexican border. Your Old Reporter ran into this startling revolutionary economic fact upon his return to the Pacific Coast in 1934 when Diesel tractors were just starting to roll as farmers bought them as fast as the manufacturers could make them as they discovered the magic problems in arithmetic they did as they divided, subtracted, multiplied and added the items of fuel volume and cost, work and crops to put the farmer and rancher using them back on the profit side after his years of losses using antiquated equipment. Queer part of the story was that competitors in the tractor business who had no Diesel units to sell were the first to discover what was happening and dramatize it in a simple statement: "The arrival of the Diesel tractor in big farming operations in the West has cut the fundamental farming costs of plowing, seedbed preparation and harvesting in half." Oliver Farm Equipment Company's Branch Manager Putnam gave this startling summary of the revolution just getting under way. Your Old Reporter found he had crystallized the facts in his sentence by a check-up with County Agents, Dealers, University engineers and economists from Canada to the Mexican border and over into Arizona. They cited custom tractor rates as then being quoted by Diesel tractor owners compared to pre-Diesel rates to prove it: plowing down from $3 an acre to $1.50, and all of the many other operations cut as deeply. That explains, of course, why International Harvester Company quickly followed Caterpillar with a series of Diesel tractors, as did Allis-Chalmers, which really led all companies with its Atlas Diesel-engined tractor shown at the 1928 California State Fair. Atlas reorganization and concentration on the marine fields stopped this early Diesel, however. Cleveland Tractor Co. met competition in the track field with Hercules Diesel for its power.

Harvesting a sea of wheat in the famed Palouse Hills of eastern Washington. Caterpillar Diesel tractor and combine coming 'round the mountain.

CLEVELAND, Ohio, June 2—It is seldom that I devote any editorial space in DIESEL PROGRESS to speeches but I listened to a talk here tonight at the Diesel Section Meeting of the Society of Automotive Engineers that meant so much to me and was so splendidly received by an audience of some 400 Diesel engineers that I have obtained permission to publish the major part of this speech and it follows herewith. The author, Captain Lisle F. Small, of the Bureau of Ships, Navy Department, took time from the tremendous pressure of work on his shoulders to come out here to Cleveland and talk to us tonight right from his heart and I say to Captain Small, in all seriousness, that the effort was more than worthwhile. He accomplished a lot here tonight for the Navy, for the Diesel Engine Industry, and for these United States, and for one, I say, "Thank you, Sir."

Captain Lisle F. Small is a man who has done much for the Diesel Industry and who is very well known to a great many of us. He, probably more than any other one man in this country, has promoted the use of Diesel engines in the United States Navy. He has patiently, persistently and with a wide vision, steered the program of adapting and adopting the economy of the Diesel to the many highly specialized requirements of the Navy. His patience, his friendliness and his ability to meet the other fellow halfway have been very instrumental in extending the use of Diesel engines by the Navy from 150,000 hp. at the end of the last war to over 12,000,000 hp., installed in a variety of Naval applications extending from the mighty 45,000 ton battleship, *Iowa*, to the most humble tugboat or landing barge. To me one of the most interesting parts of Captain Small's speech here tonight was his emphasis on the complete practicability and dependability of multiple Diesel engine drive. Whether it be by means of reduction gears or whether it be by the use of either direct current Diesel-elctric drive or alternating current Diesel-electric drive, the multiple use of Diesel engines has been applied very successfully by the Navy. I likewise was extremely interested in Captain Small's closing comments on the future of the gas turbine. I give you quotations from Captain Lisle F. Small's speech in the hope and belief that you will find them as interesting and as thought-provoking as I did.

DIESEL ENGINES IN WARTIME NAVY

By CAPTAIN LISLE F. SMALL, U.S.N.

"THE Diesel engine wins the Navy by a landslide" might well be an appropriate caption to my discussion of the lessons to be drawn from the revolutionary process of Dieselization now unfolding under the pressure of war. Any discussion of this topic properly should begin with a tribute to the vision and foresight of Vice Admiral S. M. Robinson who initiated this process in 1932 during the height of the depression when the Diesel Industry had an abundance of idle technical brains which were marking time for lack of direction and the essential funds for research. It was he who obtained from the Congress the funds to develop a high-speed Diesel engine for the Navy. It was he who started reluctant Diesel engine builders on a new tack with the result that while the Navy had only 150,000 horsepower of Diesel engines installed in submarines at the end of the last war, there are today about 12,000,000 horsepower installed in a variety of applications extending from the mighty 45,000 ton battleship *Iowa* to the most humble tug boat and landing barge.

It truly can be said that Detroit gave the Diesel

engine its new lease on life. It has been my happy privilege to be in the Bureau in charge of the Internal Combustion Engine Section at the crucial period of time when Boss Kettering and George Codrington were invited by Admiral Robinson to undertake a part in this new era which eventually led to the Dieselization of American railroads as well as the Navy. I look back on those days with a great deal of satisfaction because it is a historical fact that much was accomplished.

The war has ended the old quarrel of two cycle versus four cycle engines. It has ended in a draw. We need both types of engines somewhere, therefore, all engine builders capable of producing reliable engines are fabricating them to the utmost of their capacity.

We have hundreds of Gray marine engines (General Motors model 6-71) installed in the same type of hulls and doing the same work as other hundreds of four cycle Hercules engines. -All ships motor boats are propelled by four cycle Buda-Lanova type engines—some 8,000 have been built by Buda and the Norfolk Navy Yard jointly. All new submarines are powered by two cycle engines. Incidentally, the Germans paid us a compliment by developing for the propulsion of their submarines a copy of the General Motors V-type engine, hundreds of which have been built right here in Cleveland.

The Bureau uses a very simple diagram the rectangular coordinates of which are Brake Mean Effective Pressure and specific volume, that is, piston displacement per horsepower developed. On the diagram illustrated (Fig. 1) are superimposed a series of hyperbolic curves representing the rpm. of the engines. Any engine can be represented by a spot on this diagram which will closely define its thermodynamic perfection by the BMEP it develops to carry its load, its mechanical development by the rpm., and its weight and space requirements by the piston displacement per horsepower. In other words, this diagram indicates very closely the evolution of the Diesel engine. I have plotted on this diagram some of the historically important engines which cover the period between the last war and today. I hope the diagram demonstrates the fundamental reasons for the Dieselization of so large a part of the Navy. I think you will agree that it supplies the reason for the decision that argument of two-cycle versus four-cycle is a draw. Certainly it demonstrates that the engineer is a rational being somewhat devoid of sentiment, but in the final analysis responsive to the promptings of reason.

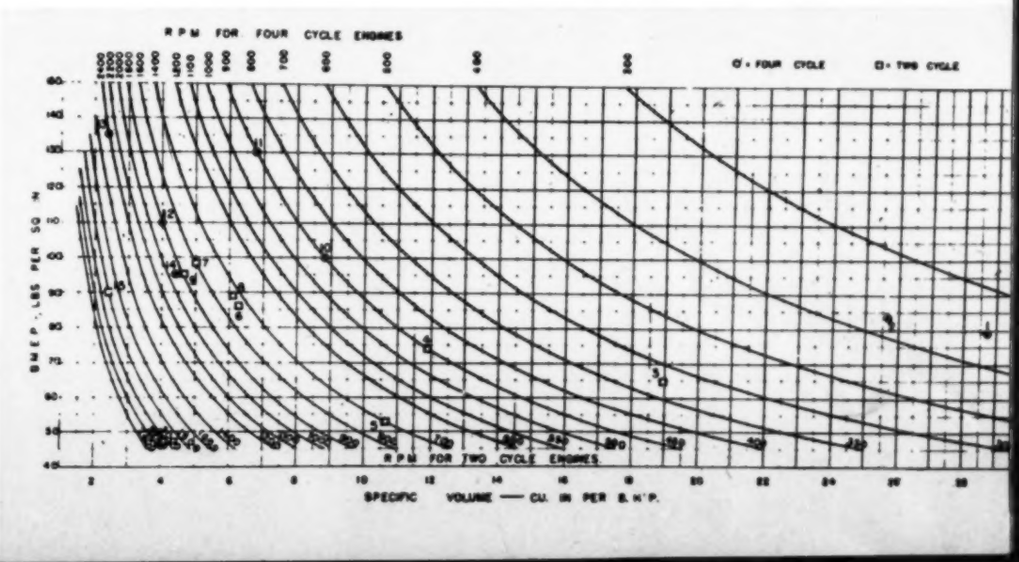
Engine No. 1 propelled the bulk of American submarines during the last war, it developed a BMEP of 74 pounds at 380 rpm. and required 28.75 cubic inches of piston displacement. It weighed 68.5 pounds per horsepower. It is still on the firing line and doing a pretty good job. Engine No. 2 represents the highest development of World War One German submarine engines. It developed 87.5 pounds BMEP at 380 rpm., required 24.7 cubic inches piston displacement and weighed 53.3 pounds per horse. Incidentally, certain prototypes of this engine are doing their bit today in American submarines. So far as we can ascertain no German U-boats have them. Both of these engines were the four cycle air injection type. No. 3 is the main engine of our first fleet submarine built shortly after the war—two cycle, BMEP 63.7 pounds at 325 rpm., requiring 19 cubic inches displacement and weighing 63.7 pounds per horsepower. No. 4 represents the main engine of the German pocket battleship—two cycle double acting, rated at 74.4 pounds BMEP (excluding scavenging blowers) at 450 rpm. Here the specific volume drops to *11.8* cubic inches and the weight is 28 pounds per horsepower. This is the first example of the welded steel frame. No. 5 is one of the German warship engines transplanted in this country under license. No. 6 is the original General Motors model 201 engine produced by Mr. Codrington here in Cleveland which became the prototype of a number of engines now working in the Navy and on U. S. railroads, its latest development being No. 7.

No. 8 is the original and No. 9 is the present state of another two-cycle, opposed piston type of engine by Fairbanks-Morse now used extensively in the Navy. No. 10 represents another product of the George Codrington dynamic personality. It is a four cycle engine designed to do its utmost for the type. Later it was equipped with a Buchi turbocharger and performed as No. 11. No. 12 represents a recently completed four cycle engine with a mechanically driven supercharger. No. 13 is another engine with the type of supercharger which represents the highest level of development, a considerable number of which are installed in special power boats. No. 14 is one of the engines used in great quantity in the Navy ships' boats. No. 15 is the famous pancake engine.

Another argument of long standing is definitely being settled by the war requirements in the Navy—should Diesel engines be directly coupled to the propeller shaft or should they drive indirectly, and, if so, should they be geared to it or should electric drive be used. In the submarines of the last war, the engines were direct coupled and only two engines were used. In submarines of all foreign navies, this is still the universal practice. The arrangement is simple and easily understood by the operating personnel. The manually operated throttle control, reminiscent of steam practice, is an exceedingly simple and reliable method. Many tugs and similar auxiliary craft retain direct coupling of the engine to the propeller shaft.

When the design of the modern American submarine was under discussion the Navy was faced with the necessity of more than doubling the output of the propelling engines for the same hull, consequently, a much lighter and more compact high speed engine had to be developed. Both direct current electric drive and gear drive were employed successfully. Instead of six to ten working pistons for each propeller we now have as many as forty. Every exploit of our submarines in enemy waters, often five thousand miles away from home bases, testifies to the reliable performance of the indirect drive used in them. There is no equivocation on that point. There is no doubt that the higher level of intelligence of our submarine crews contributes greatly to the success achieved. We are building ships to be operated by American boys who in civilian life rode

Fig. 1—chart referred to above by Captain Small.



in automobiles, who operated tractors and trucks and are not bewildered by internal combustion engines. Without question, we enjoy a favored position in this respect.

The successful use of indirect drive in submarines supplied the impetus to make similar application to many powerful auxiliary ships. In certain instances alternating current electrical drive was used, and the results were most gratifying. The maximum number of Diesel generators per shaft employed so far has been four. There is no reason why that number cannot be increased widely, maintaining comparable simplicity. Multiple engine geared drive has been used very successfully. Likewise, a combination of electric and gear drive has given excellent results. All of these arrangements can be classified simply as a multi-engine indirect drive. This application has much inherent merit, particularly in regard to flexibility. It permits one and the same type of engine to be used in propelling plants twice, four, eight, etc., times its output, resulting in real mass production of a comparatively small number of standardized units. And this much must be emphasized, a multiple Diesel engine drive provides the opportunity to maintain high fuel economy over the entire operating power range. This is extremely important in the Navy because our vessels must run at speeds determined by tactical consideration.

One of the most important contributions of the Navy to the development of the high speed Diesel engine was its firm insistence on welded steel construction. From the very beginning, the Bureau realized that the lightweight structure could be obtained either by using castings of metals of low specific weight or by the selected method of welded steel. The art of welding was in its swaddling clothes when the decision had to be made. Later events replete with the phenomena of shock have testified to the wisdom of the decision. Fortunately when war came, welding technique and welded frame construction had been perfected to the point that production at a high rate could go forward up to the capacity of available facilities. This development was not without headaches and uneasiness, such, as for instance, followed the discovery of a great number of cracks in several large engine frames of the same type after a most successful performance of over two years. In this instance, the enthusiasm and persistence of those great pioneers of welding brought out on the next attempt a design in all respects sound and acceptable. Welding, as no other known art, has progressed most consistently on the premise that one learns most from his mistakes. A welding engineer is very much like the old hobo who said that his only regrets were the temptations that he had successfully resisted. However, I salute the welding fraternity. Today we are sure of the fundamentals of welding and we can produce quickly and with certainty out of welded steel a very light structure for the Diesel engine.

When war broke out in Europe and mines, torpedoes, and bombs began to assail the ships of our present allies, providing thereby a most realistic proving ground for their equipment, the wisdom of selecting a welded steel structure for our new Diesel engines could no longer be questioned. Bitter experience proved that because of its large elongation under stress, steel is the only readily available material that can resist successfully the shocks imposed by war.

In or out of war, there is one form of vibration which bedevils all of us. No one will have to guess that I mean torsional vibration of shafting. Our experts in this department ascribe nuisance value to it largely because it makes a problem out of every new combination of an engine with its load absorbing device. Propriety doesn't permit me to speak with nautical frankness on this subject. Based on some recent experiences, I feel that nothing has ever been done so successfully before as nothing has been done in the last five years towards cleaning up this mess. Someone may like to edit the word "mess," but the dictionary defines "mess" as "a confusing and embarrassing situation," and, therefore, the word stays "put." We started out years ago to do something about torsional vibration and good progress was made. Then the war started in Europe and we began to get production-minded to the exclusion of everything else. We should never have side-tracked the subject of torsional vibration. It is distinctly an industry matter and it cannot be handled by individual manufacturers. I beg of this society to grab the torch because, through a combination of carelessness and "status quo" mindedness, troubles from torsional vibrations are appearing in places ripe for adverse advertising.

Just a word now about a subject that is on everybody's mind—bottlenecks. War does funny things. What used to be the name of a convenient gripe for a little liquid stimulant is now used to describe a manufacturing nightmare. Shortly before, and immediately after Pearl Harbor, extensive additional facilities were authorized for the Diesel industry. The expanded Diesel production eventually demonstrated weak links of the industry as a whole. Number one worry, which has never receded from the foremost position, was forgings, particularly crankshafts. The forging fraternity has performed admirably, however if that industry is going to survive, it must cut down on the excess metal in black forgings. A modern improvement in this direction will save millions of manhours and it must be made. If certain of our leading engine manufacturers had not standardized on cast crankshafts, I am convinced that our position in the present war would be much less favorable today than it is. I mention this merely as a commendation for the vision on their part, and I allude in no sense to the merits of either cast or forged crankshafts. Thank God we had both kinds.

Today we are seriously worried about the available manufacturing capacity for bearings. The aircraft program imposes heavy demands for bearings and the automotive industry has suffered accordingly. The Bureau of Ships has been in constant touch with the bearing manufacturers and I must report their position is critical. They need a few kind words and fewer unpleasant invectives.

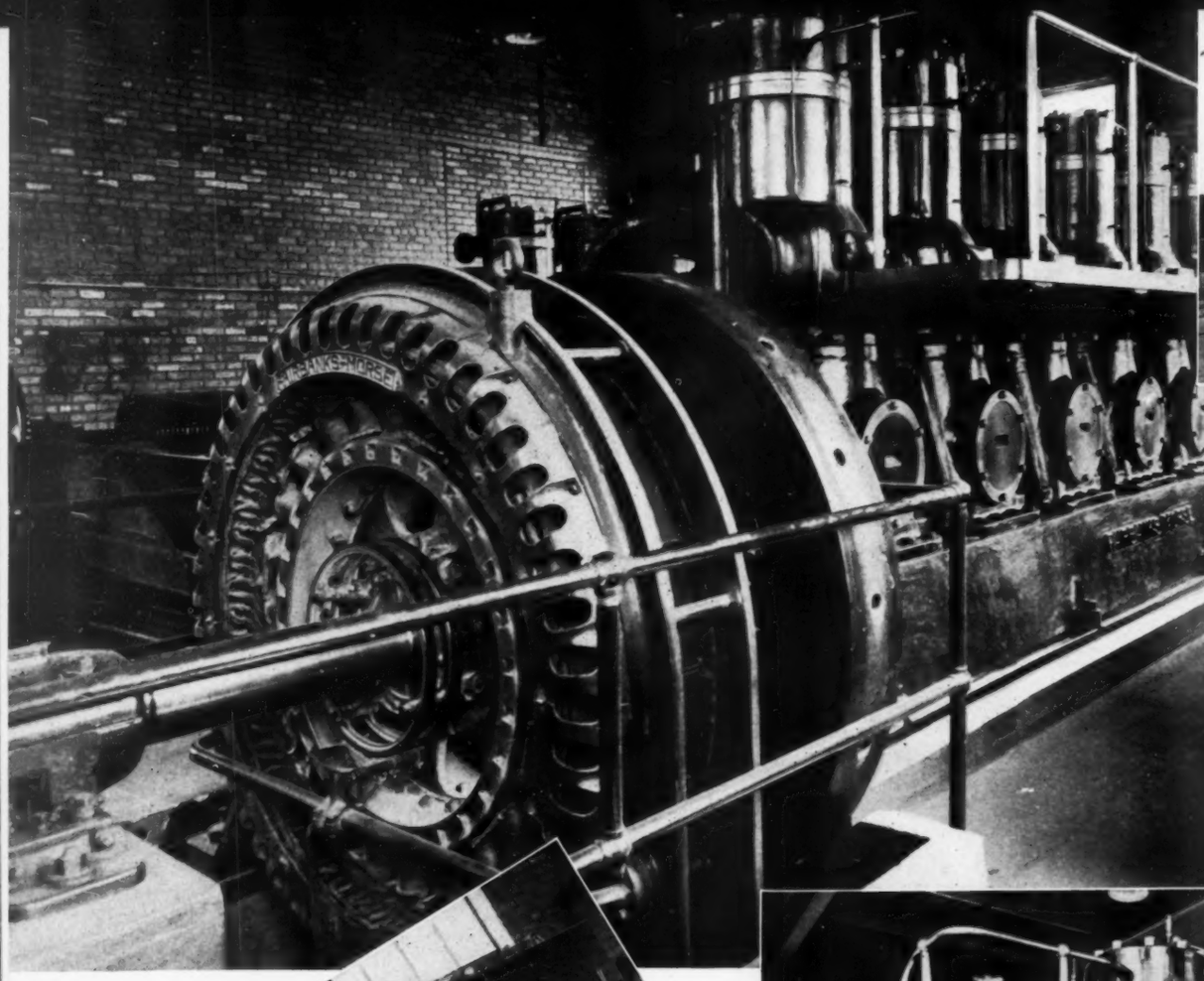
The most widely discussed subject that comes to my ears today is "spare parts." The operation and maintenance of such vast numbers of engines by the Navy all over the globe presents a serious problem of providing spare parts for them. An imposing forty million dollar spare part center was created at Mechanicsburg, Pennsylvania, and an extensive service organization was set up there. In accordance with available use tables, staggering quantities of spare parts have been ordered. It was soon discovered that a too ambitious spare parts program would interfere with the production of new engines and two things had to be done—the delivery of spares had to be reduced and the demand for spares lessened by sending competent trouble-shooters into the field to educate the operating personnel in the vital need for conserving spare parts. For years every garage man, every overhaul mechanic has been trained to squander spare parts. Those men now are in uniform in Africa, Iceland, Attu, etc. The shoe is on the other foot now and it is pinching like mischief. We are paying very dearly for the unique misconceptions created when spare parts were glibly spoken of as worth their weight in gold. They are worth their weight in gold today, but in an entirely different metaphorical sense. I hope we weather the spare part storm. It is here and it presents some grim problems. Two approaches to relief offer fairly quick returns. First, salvage centers are being established in conjunction with distribution centers. The operating personnel are being taught to cannibalize engines damaged beyond repair or

. . . . *And now please turn to page 60* . . . .

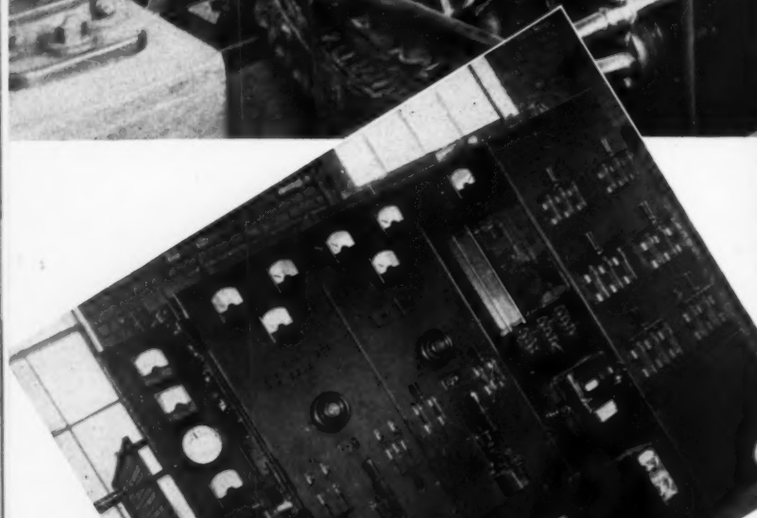
MARITIME M TO NORDBERG

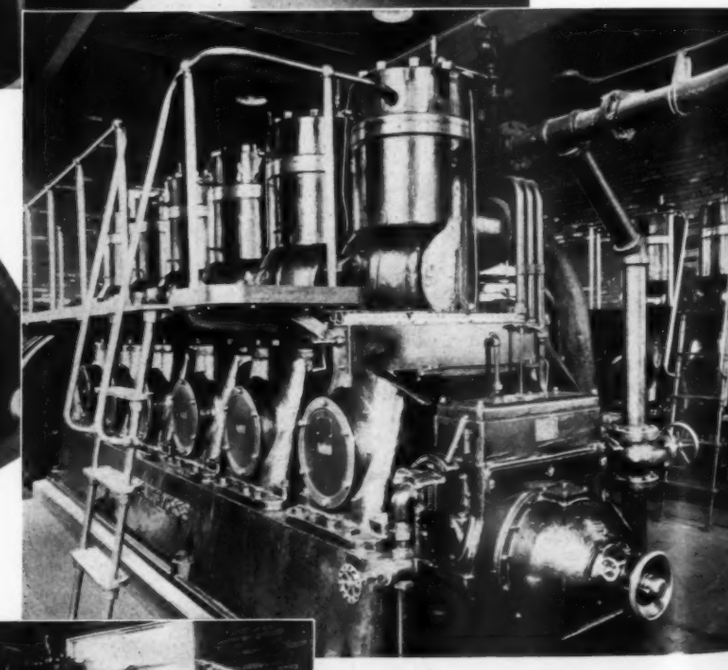
By
REX W. WADMAN

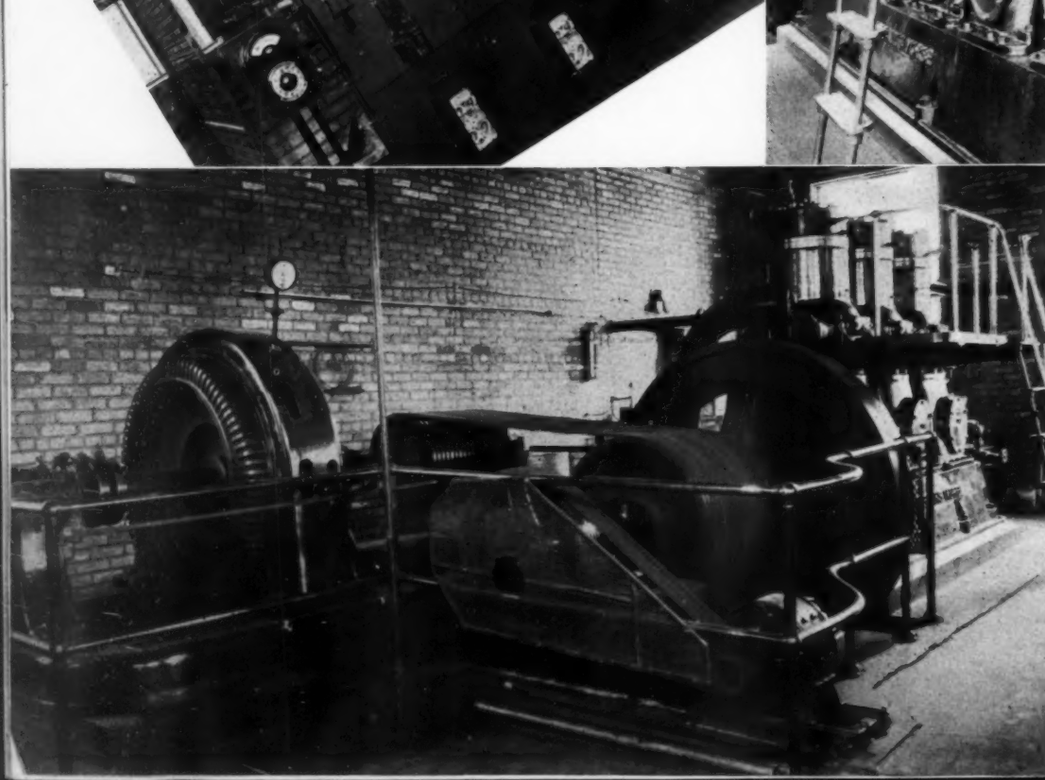
MILWAUKEE, Wis., May 17, 1943—Almost a year ago to the day—in fact it was May 15 of 1942—I stood here in the huge Nordberg shops and witnessed the presentation of the Navy E to Nordberg officials and employees and I wrote about it on page 58 of the June issue of last year. Today it was my pleasure to stand here again and hear Admiral Howard L. Vickery, Commissioner, United States Maritime Commission, present to President Robert E. Friend the Maritime M, thus making Nordberg the first company, in Wisconsin at least, to be privileged to fly both the Navy E and the Maritime M. The short, emphatic talk made here today by Admiral Vickery was an inspiration to me and I know it must have been to over 5,000 other people who here listened to him. The marvelous job which American shipyards have done and are doing was spoken of in no uncertain language by the Admiral. The job which Nordberg and other engine building shops have accomplished to make the building and launching of these ships possible was also well emphasized. It is good to know that one of our oldest Diesel engine builders, with an enviable reputation in pre-war days of building good engines on time, has given such an excellent account of itself under the extreme pressure of war activity. My hearty congratulations go out to Robert E. Friend as President of the company and to all his employees. We, of the Diesel engine industry, are very proud of him and of the part that Nordberg Diesels have played in this all-out war.



Left: Close-up of the 420 hp. F-M Diesel and 284 kw. alternator. Above: View of the Cargill power house showing engine intake stacks, and the two exhaust silencers, one F-M and one Maxim.







Above: Control end of the F-M, 420 hp. Diesel, foreground, and the 210 hp. unit, right, background. Upper left: On the switchboard are seen GE instruments, Westinghouse recording demand meter and Brown pyrometer. Left: In this view of the 210 hp. F-M Diesel is also seen the EM, 135 kw. generator.

AN EIGHT-YEAR COST RECORD OF RAIN ELEVATOR DIESELS

By HENRY J. BARBOUR

IT is common enough to find Diesels in flour mill service, pulling a steady load and producing power at a low cost per kilowatt hour. Evidence is accumulating that Diesels also have met the more difficult power problem of the terminal grain elevator with equal success. An elevator presents a hard, uneconomical load, whatever the source of power. The demand fluctuates sharply, with high peaks and comparatively small energy consumption. If the company purchases power, it must pay a high demand charge, bringing up the average cost per kilowatt-hour. If the company prefers to make its own power, it must provide a plant large enough and sturdy enough to handle the sudden peaks. The problem is to find what form of power supply will meet the demand at the smallest cost.

Cargill, Inc., large elevator operator, has depended on a two-engine Fairbanks-Morse Diesel plant for more than eight years to supply all power requirements of Elevator T at Minneapolis, Minn. The fact that the same equipment was operated previously with purchased power makes cost comparisons feasible. This concern has effected a reduction in power cost of more than 50 percent, resulting in a cash saving of more than $58,000 in 8 years of operation.

Cargill switched to Diesels in 1934, installing one 420-hp., two-cycle, mechanical-injection Fairbanks-Morse Diesel, direct-connected to a 284 kw., 3-phase, 60-cycle, 480 volt F-M generator with V-belted exciter, and one 210-hp. F-M Diesel of the same type V-belted to a 135 kw. Electric Machinery generator with belted exciter. Since these units were put into service, they have generated more than six million kilowatt hours. Shown herewith is the full picture of Diesel costs and the purchased power cost at prevailing rates for equivalent service for the first eight years of operation.

The saving in this period was more than enough to pay for the entire investment in the power plant, leaving a net profit for the company. Cargill now can put the entire saving, which averages more than $7,000 a year, into net profit.

The operators, who have other duties in the elevator, try to give their engines the best possible load factor, but the very nature of the load makes this difficult. With the demand jumping as high as 384 kw., both Diesels must be run much of the time. Despite the continual surges of a fluctuating load, plant experience has been free of breakdown. A maintenance program is followed to keep engines in condition at all times, and major inspections are timed so as not to interfere with company operations. Load, production and consumption figures are recorded hourly and each month a summary report is prepared with comparative figures on Diesel and purchased power costs. The four-panel switchboard with G.E. synchroscope, totalizing kilowatt-hour meters, vibrating contact voltage regulator, frequency, power factor and reactive Kva. meters, and a Westinghouse recording demand meter makes accurate record-keeping possible.

The engines are assured clean fuel, lube, water and air. Fuel is unloaded by gravity into a 15,000 gallon underground storage tank near the power house and transferred to a motor-driven rotary pump through individual meters to two 300 gallon day tanks inside the plant below floor level. A built-in pump on each engine draws fuel from its day tank through a filter to the small supply tank on the engine in which the injection pumps are partially immersed. Scavenging air for both engines is drawn through a stack into an air house and then through impingement-type filters before reaching the crankcases of these crankcase-scavenging Diesels.

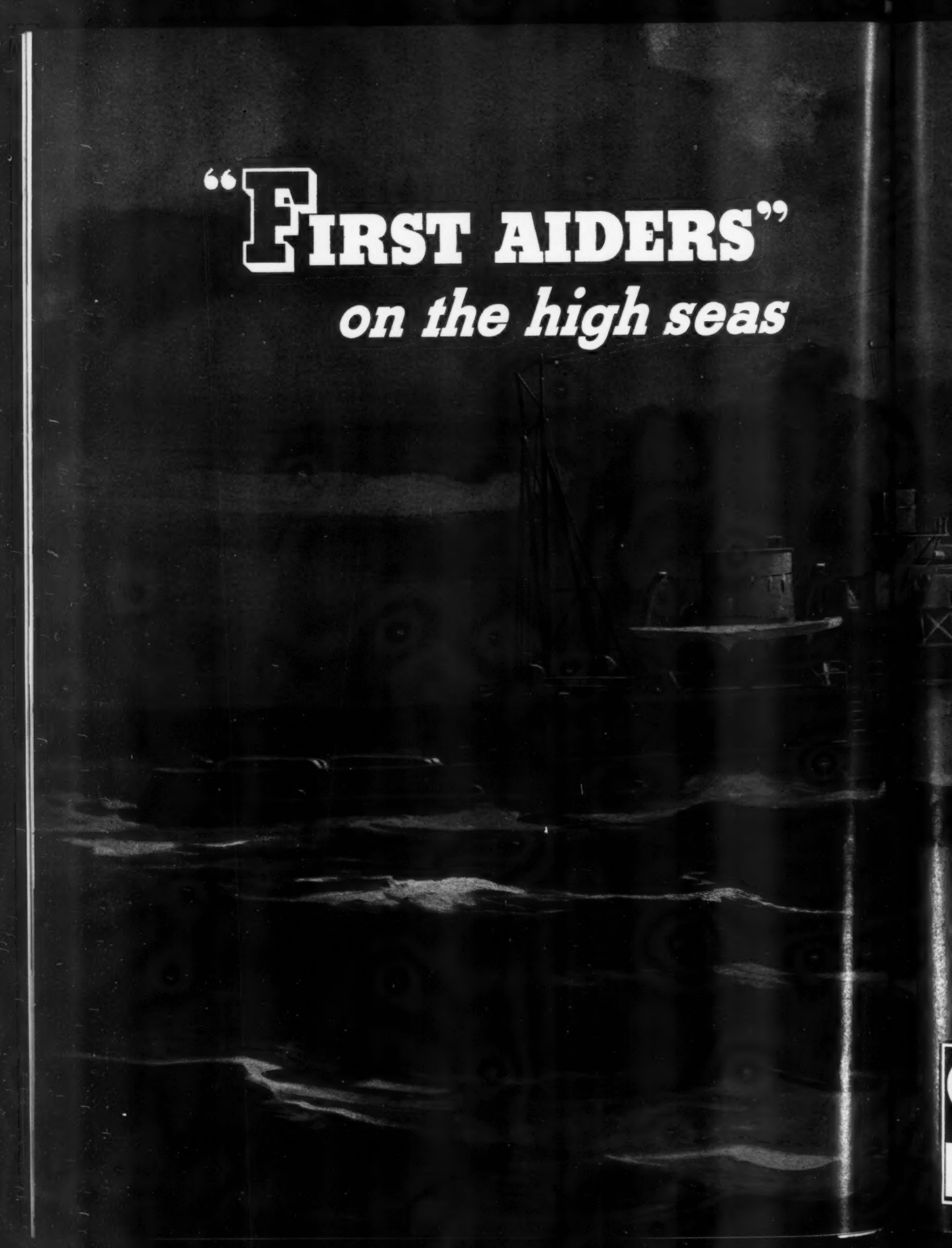
Lubricating oil (Texaco Algol) is provided to each engine automatically from an individual supply tank for the bearing lubrication system. Oil picked up by the wiper rings drains to a used oil tank and is cleaned periodically in a Hilco activated clay purifier and then pumped through Zenith filters to the engine supply tanks. Engine cylinders are supplied with lube by Madison-Kipp lubricators.

Indirect cooling is employed using a Griscom-Russel heat exchanger and two motor-driven Fairbanks-Morse centrifugal pumps. Raw water is passed over an atmospheric-type cooling tower. City water is used for makeup in the jacket circuit while raw makeup is drawn from a nearby pond. Starting air for the Diesels is provided by either of two F-M compressors, one belted to an electric motor, the other direct-connected to a small gasoline engine. Exhaust gases vent through vertical silencers outside the plant, a Maxim and a Fairbanks-Morse.

Cargill has the reputation of a pioneer in new equipment and operating methods and it was fitting that this company should be the first in the great grain country of the Midwest to place full dependence on Diesel-electric power for terminal elevator operation. The experience of eight years demonstrates conclusively that Diesels can handle the difficult load and return sizeable power profits.

Operating Costs For 8 Years
1934 to 1941 Inclusive

Kilowatt hours consumed		6,458,900
Fuel and Lubricating Oil	$41,221.99	
Labor	$ 9,698.90	
Maintenance and Repair	$ 3,593.70	
Supplies and Miscellaneous	$ 2,709.52	
Total Operating Cost	$57,224.11	
Diesel Cost per Kw.Hr.		8.86 mills
Total Cost Equivalent Purchased Power	$115,809.36	
Purchased Power Cost Per Kw.Hr.		17.93 mills
Total Savings	$58,585.24	
Saving per Kw.Hr.		9.07 mills

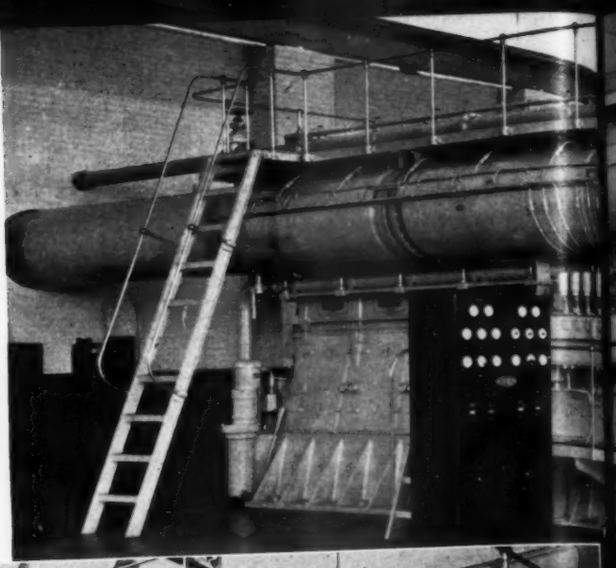

"FIRST AIDERS"
on the high seas

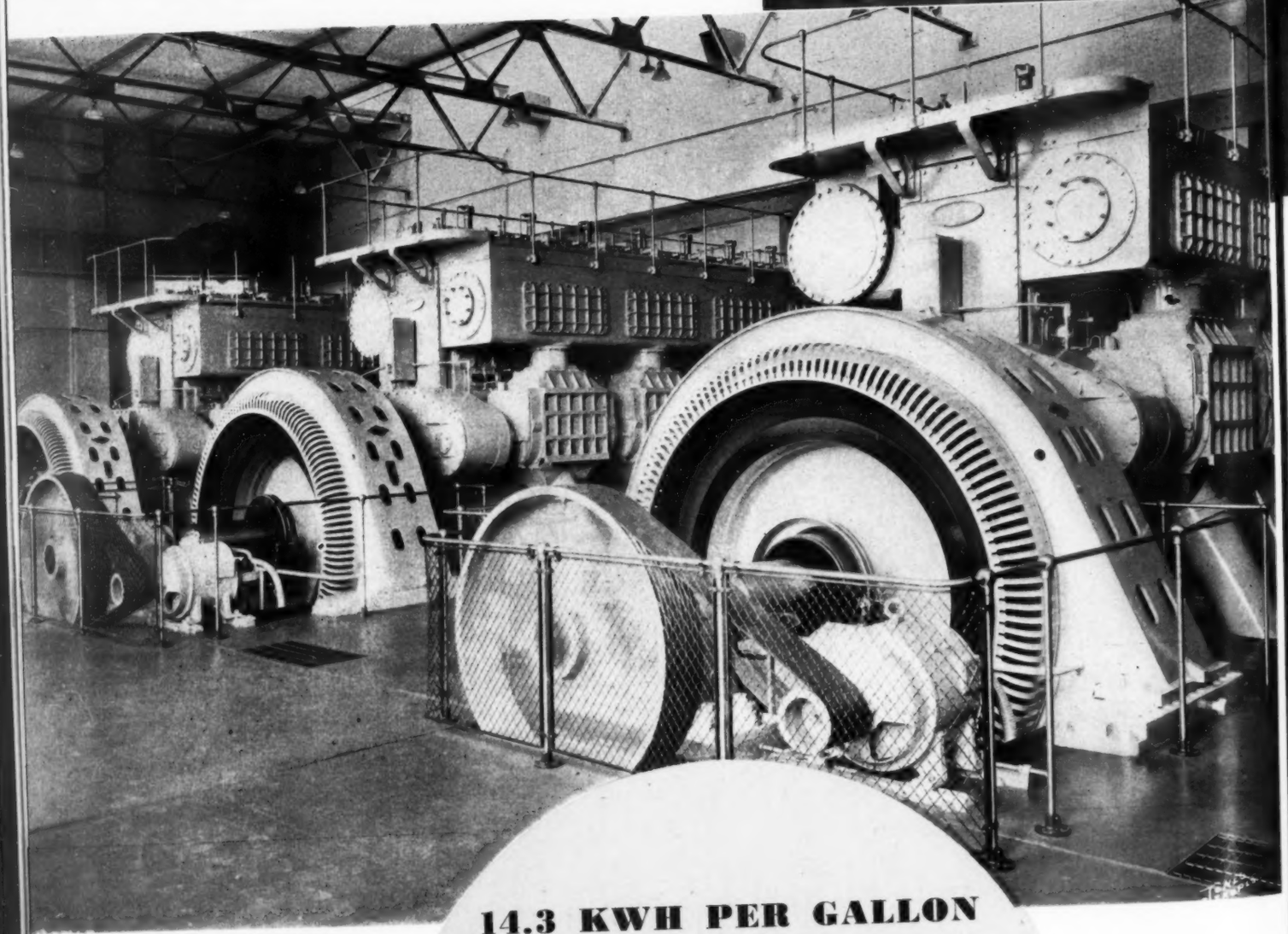
NO ships must be more dependable—none more able to keep doggedly at it—than these tough, deep-sea rescue tugs. Already they've saved several million tons of shipping.

Both America's and Britain's Navies have fleets of them in service—powered by reliable General Motors Diesels.

And again these engines are turning in the same day-in-day-out fine job that they have in thousands of Navy, Coast Guard and commercial vessels.

GM
GENERAL MOTORS
DIESEL POWER

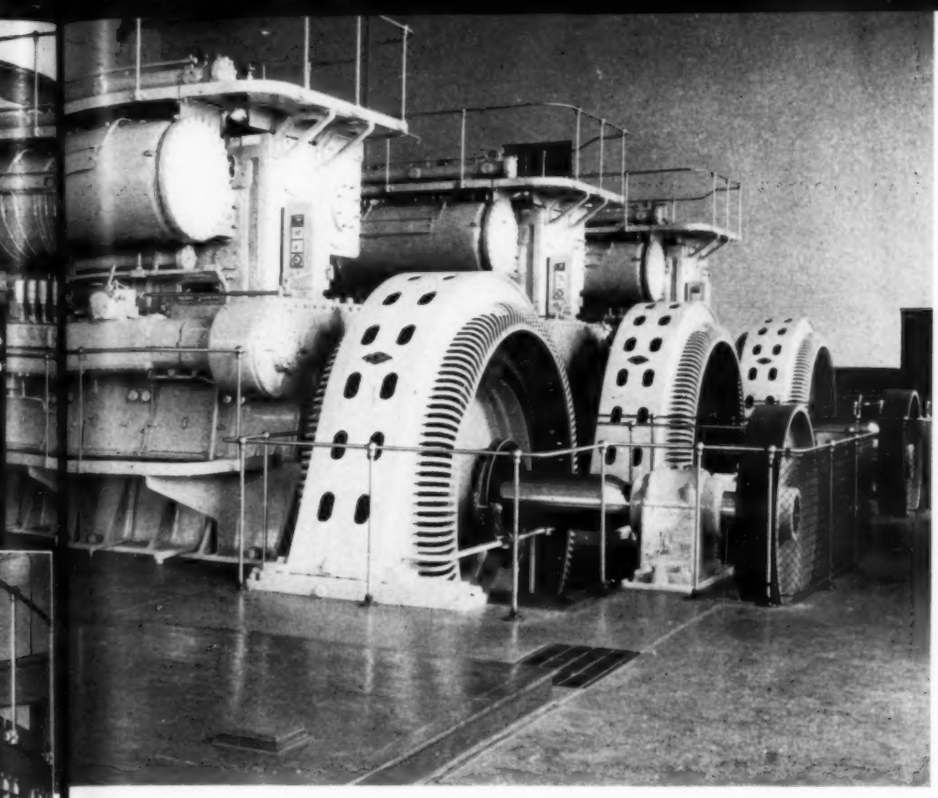




Upper left: Power plant and substation at Rushville, Indiana. Above: Three Busch-Sulzer Diesels, each nine cylinders, rated 3,060 hp., and EM generators.

14.3 KWH PER GALLON AT RUSHVILLE, INDIANA

By GLENN C. BOYER*



Operating side of the Busch-Sulzer Diesels. Note Woodward governors, Adeco fuel injection pumps and on the gauge panel, Alnor pyrometer.

DESIGNED for high fuel economy and low station power consumption at widely varying loads, the Diesel-electric generating station put into operation by the Southeastern Indiana Power Company at Rushville, Indiana, in October, 1942, has during the first five months of operation made an impressive record. Fuel economy has averaged 14.3 kwh. per gallon of fuel consumed while the power used for station auxiliaries has averaged only 1.4 per cent of the gross generation.

The station contains three Busch-Sulzer 3,060 hp., 9 cylinder, two-stroke cycle, trunk piston, 240 rpm., mechanical injection engines directly connected to 2,700 kva., 2,160 kw., 4,150 volt alternators. Excitation is supplied by individual V-belt driven exciters. The engines are equipped for burning low-gravity, high-viscosity fuels. The engine cylinders have a bore of 20½ in. and a stroke of 27½ in.

The plant was originally planned to contain four units instead of the three now installed, and a contract was let for the four units in March, 1941. Before the final unit had been installed in the plant, the War Production Board found it necessary to divert this unit elsewhere, and as a result only three units are now installed. Foundations, piping, switchgear, and other accessories necessary for the fourth unit have been provided for the unit when available.

The Southeastern Indiana Power Company, with headquarters at Rushville, Indiana, serves farms, R.E.A. projects, municipalities, and industries in eleven surrounding counties. Power was formerly purchased wholesale from the Public Service Company of Indiana. Prior to the installation of this plant, the company made extensive studies of the economies of generating their power requirements either with steam turbines or Diesel engines. After considerable investigation, including the examination of many plants throughout the United States, it was decided to build a modern Diesel-electric generating station.

The company possesses a building 125 ft. x 111 ft. which had been a steam power station supplying 25-cycle power for an interurban traction system. While the equipment was removed some years ago, and the building used for industrial purposes, an examination of the structure indicated that it was of sufficient size for a Diesel-electric plant of 10,000 to 12,000 kw. and would house a maximum of five units. The engine room with a span of 65 feet was found suitable for housing the engine-generating units, while the former boiler room was satisfactory for housing silencers, air intake filters, jacket water pumps, fuel and lubricating oil conditioning equipment, and other plant auxiliaries. Raw water pumps for the cooling system are installed in a pit constructed in the east end of the auxiliary room basement.

Before reconditioning this structure to serve for a Diesel plant, extensive studies were made of the soil bearing characteristics for engine foundations as well as the general structural conditions of the building. Soil surveys were made by Robert W. Hunt & Company of Chicago.

All four engine foundations rest on a common reinforced concrete mat. The mat, engine foundations, and operating floor slabs between engine foundations are all constructed integral and are isolated from the building to eliminate possible vibration transmission.

Engine cooling is accomplished by the use of a double-circuit, closed cooling system. Each engine is provided with two tubular heat exchangers, one for cooling engine jacket water while the other is used for lube oil cooling. All jacket cooling water is softened and supplied to all engines from a common source. Three 1400 gpm. jacket water pumps are used with one pump held in reserve under the maximum plant load conditions. All cooling water pumps discharge into a common header. At each engine a cooling water connection is made to this header. The cooling water flows from the header through the closed heater for jacket water cooling and then to the engine cylinder jackets. It returns from the engine to a common header which is the suction line for the pumps. An expansion tank is installed on this suction header to absorb the variation in the volume of cooling water due to temperature changes.

Raw water required for jacket water and lubricating oil cooling is taken from a millrace adjoining the plant. Intake and discharge tunnels installed in the original steam plant were utilized in so far as possible in connection with the cooling system required for the engine installation. In the east end of the auxiliary room a pump pit was constructed with the floor level at an elevation such that water flowed from the millrace by gravity into the suction of the raw water pumps. Three pumps, each of 1650 gpm. capacity were installed and a connection has been provided in the pit for a fourth pump unit if necessary due to increased size of the plant. At present two of the existing pumps will deliver sufficient cooling water for the maximum load conditions.

Low consumption of electricity for station auxiliaries resulted from the design employed for the cooling water system as well as the extensive

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* Associate Engineer, Burns & McDonnell Engineering Company.

use of engine exhaust heat for fuel, lubricating oil, and general building heating. All heating needs of the plant, with the exception of heat required when unloading tankcars of fuel during winter months, are supplied from the engine exhausts. Each engine exhaust snubber is equipped with a fire-tube type hot-water boiler section arranged for controlling the hot water output in accordance with the demand. The hot water obtained from these boilers is employed for heating bulk storage tanks, clean-oil tank, lubricating-oil tanks, engine day tanks, and fuel oil previous to centrifuging. It is also used to heat the office, locker room, and for hot water in the showers and lavatories.

Hot-air is used for heating the plant building. A single forced draft fan together with connecting duct work draws cold air from the plant basement, circulates it through metal jackets built around the snubber bodies, and discharges the hot air either into the engine room or auxiliary room as required. The ductwork is arranged so that the air from the fan can be directed to those snubbers which are connected to engines in operation, and the outlet louvres are provided with shutters which permit a very close control of the flow of hot air in either the engine or auxiliary room. The heating ductwork is arranged so that the hot air can be discharged above the auxiliary room roof during the summer months, thereby helping to cool the auxiliary room.

Fuel storage facilities consist of two 12,500 barrel bulk storage tanks located on a plot of ground to the north of the plant site proper and across the right-of-way of the Baltimore and Ohio Railroad. Fuel oil is unloaded directly from tankcars to these tanks and the unloading system permits handling oil from four tank cars and one truck simultaneously. Before going to the engine fuel system, oil from these bulk storage tanks is heated, centrifuged, and discharged into a buried 10,000 gallon clean-oil tank where it is maintained at a temperature of 140° F. From this clean-oil tank, the fuel is pumped to the engine day tanks as required. All fuel is metered as it is transferred to the engine day tanks by Bowser meters compensated for temperature variation. A 15,000 gallon underground storage of light fuel oil is provided for starting and stopping the engines.

A 15,000 gallon, two-compartment lubricating oil tank is provided. This tank is buried and equipped with heating facilities. Lubricating oil is purchased in tankcar lots. The two compartments in the storage tank are used for cylinder and bearing lubricant since a different grade oil is used for each service. Calibrated level gauges on the engine lubricant tanks are employed to measure the lubricating oil consumption. Lubricating oil is pumped from the storage tank to the engines by motor driven transfer pumps.

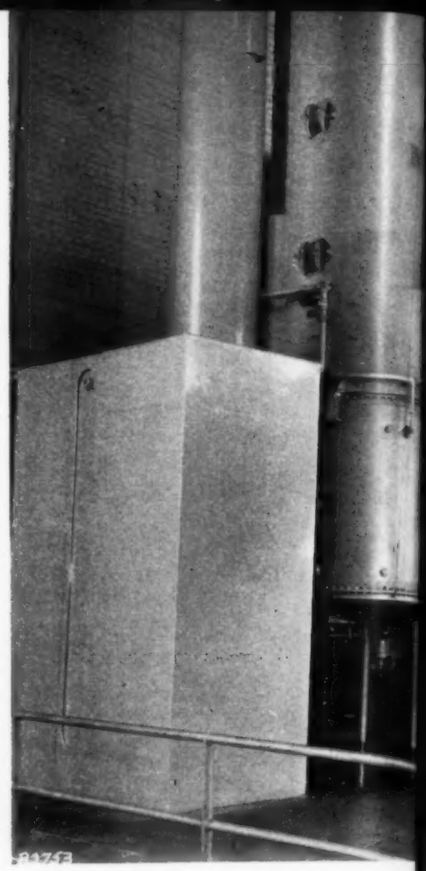
Meters, instruments, and control equipment for the operation of the engines and their accessories were given considerable study in the planning of this installation. Automatic temperature control valves are used for controlling the temperature in the clean fuel and lubricating oil tanks, and centrifuge and engine fuel-oil heaters. Engine instruments and alarms for each engine are mounted in a cubicle located on the operating floor near the engine operating platform. In this position the instruments are visible to the operator either from the engine control center or the operating floor. All controls for motor-driven auxiliaries are grouped on a common control cubicle together with instruments used for general plant operation.

Continuous automatic air filters encased in steel housings are installed in the auxiliary room. Air is brought to the filters from a point above the auxiliary room roof.

Power is generated at 4160 volts and stepped up by transformers to 34,500 volts in an outdoor substation for delivery to the distribution system. The indoor switch gear consists of an eleven panel cubicle-type control board and nine metalclad "DE-ION" air circuit breaker units. Two of the control panels are used for station metering and control of the substation breakers. The balance of the control panels together with the metalclad circuit breaker units provide for two 4160 volt feeders supplying the substation, two station service feeders, four generator circuits and one bus sectionalizing circuit. The control board is located adjacent to the generators while the circuit breakers are installed in a separate switch gear room.

The 4160 volt bus is sectionalized—each half connecting two generator circuits, one substation feeder circuit and one station service circuit. The other half of the bus is identical. This arrangement insures continuity of service at all times while providing for maintenance or additions to be made on a "cold" bus.

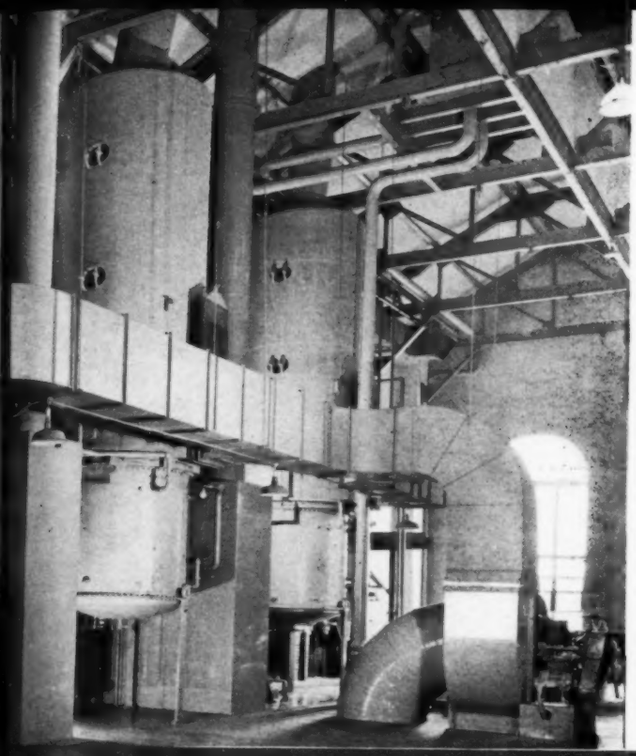
Two station feeders each connected to a 300 kva. 4160/480 volt station service transformer are provided—one being a spare. Preferred and emergency control is utilized to insure auxiliary power at all times. The 480 volt station power is distributed from a single metalclad distribution panel, through a Trumbull Flex-A-Power distribution feeder located on the auxiliary room wall and extending the entire length of the plant. Plant auxiliaries are connected into this feeder at the most convenient points throughout its entire length. Three 480/120 volt dry type transformers, each of 10 kva. capacity, supply station lighting.

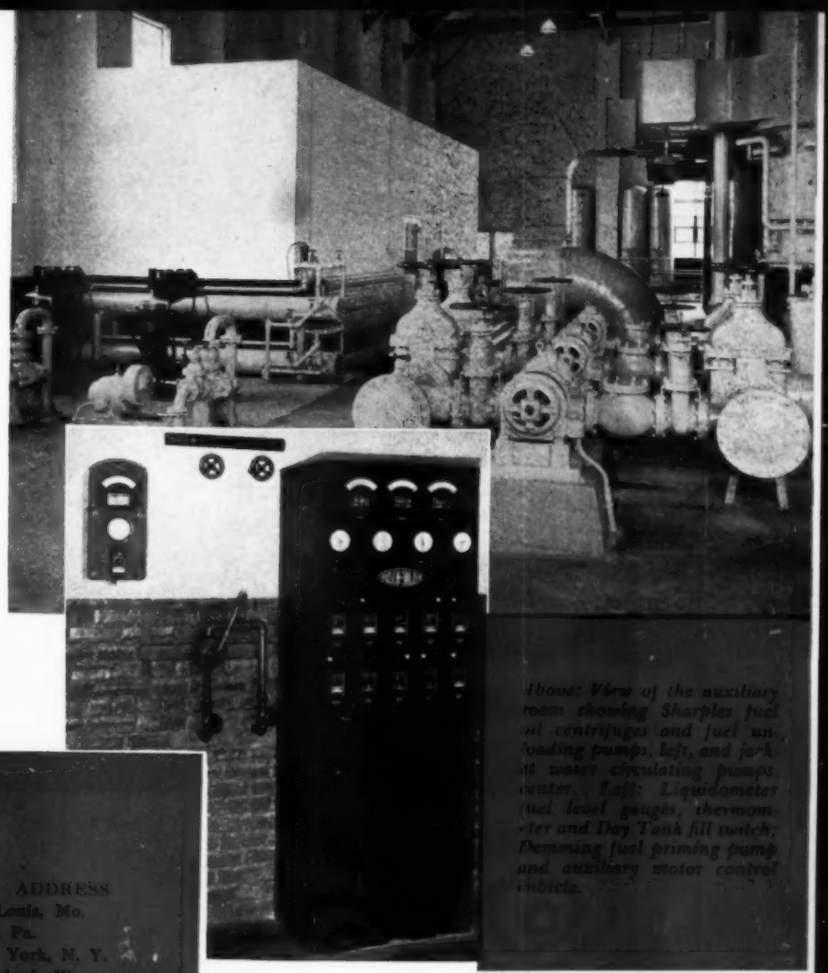


View of the Burgess combination waste heat boilers and exhaust snubbers. Air, warmed by passing through the snubber jackets, is used to heat the plant.

An outdoor substation is located adjacent to the power plant and the step-up transformers and distribution circuit breakers are located at this point. The 4160 volt feeder circuits are carried underground from the plant to this substation. Two main step-up transformers are installed—each of 6000/8000 kva. capacity, 4160/34,500 volts. They are of the combination self and fan-cooled type.

There are a total of four outgoing 34,500 volt overhead distribution circuits and three of these are connected to a 34,500 volt bus by oil circuit breakers of the "DE-ION" type. The fourth circuit is connected to the bus through high-voltage fuses. Breakers are operated from the control board inside the plant. The high volt-





Above: View of the auxiliary room showing Sharples fuel oil centrifuges and fuel unloading pumps, left, and jacket water circulating pumps, center. Left: Liquidometer fuel level gauges, thermometer and Day Tank fill switch; Dempsey fuel priming pump and auxiliary motor control cubicle.

LIST OF EQUIPMENT

Southeastern Indiana Power Co., Rushville, Indiana

PRODUCT	SUPPLIER	ADDRESS
Engines	Busch-Sulzer Bros.-Diesel Eng. Co.	St. Louis, Mo.
Shafts	Erie Forge Company	Erie, Pa.
Lubricators	Nathan Mfg. Co.	New York, N. Y.
Governors	Woodward Governor Co.	Rockford, Ill.
Generators & Exciters	Electric Machinery Mfg. Co.	Minneapolis, Minn.
Switchgear & Switchboard	Westinghouse Electric & Mfg. Co.	E. Pittsburgh, Pa.
Transformers & Substations	Westinghouse Electric & Mfg. Co.	E. Pittsburgh, Pa.
Jacket Water Waste Heat Boilers		
Batteries	Burgess Battery Co.	Chicago, Ill.
Air Filters	American Air Filter Company	Louisville, Ky.
Air Compressors	Gardner Denver Company	Quincy, Ill.
Fuel Oil Centrifuges	Sharples Corp.	Philadelphia, Pa.
Fuel Oil Filters	Purolator Products Inc.	Newark, N. J.
Fuel Oil Heaters, Strainers & Air Vents		
Fuel Oil Meter	S. F. Bowser Company, Inc.	Ft. Wayne, Ind.
Feedwater Heaters	Worthington-Gamon Company	Harrison, N. J.
Thermostats for Fuel Heating Control	Ross Heater & Mfg. Co.	Buffalo, N. Y.
Lubricating Oil Coolers	The Powers Regulator Co.	Chicago, Ill.
Lubricating Oil Purifier	Ross Heater & Mfg. Co.	Buffalo, N. Y.
Transfer Pumps	Youngstown-Miller Company	Sandusky, Ohio
Fuel Meters for Oil Transfer	Yale-Towne Mfg. Co.	Stamford, Conn.
Pumps	Master Electric Company	Dayton, Ohio
Storage Tanks	Graver Tank Mfg. Co., Inc.	E. Chicago, Ind.
Underground Pipe	The Elc-Wil Company	Cleveland, Ohio
Jacket Water Heat Exchangers	Ross Heater & Mfg. Company	Buffalo, N. Y.
Water Pumps	Dayton-Dowd Company	Quincy, Ill.
Water Strainers	Micro-Westco, Inc.	Bettendorf, Iowa
Heating Boiler	Kewanee Boiler Company	Kewanee, Ill.
Oil Burner	Ray Oil Burner Company	Los Angeles, Cal.
Water Softener and Sand Filter	The Permutit Company	New York, N. Y.
Air Heating Fan	B. F. Sturtevant Co.	Sturtevant, Wisc.
Fuel Oil Transfer Air Foil Motor	Cutler-Hammer Inc.	Milwaukee, Wisc.
Thermostats for Air Heating System	The Powers Regulator Co.	Chicago, Ill.
Motor Starting Controls	General Electric Co.	Schenectady, N. Y.
Electric Valves	Alco Valve Company	St. Louis, Mo.
Switchboard Instruments	The Mercoid Corp.	Chicago, Ill.
Water Thermocouples	Illinois Testing Laboratories	Chicago, Ill.
Gauges & Thermometers	Jas. P. Marsh Corporation	Chicago, Ill.
Fuel Storage Tank Level Gauges	The Viking Pump Company	Cedar Falls, Iowa
Day Tank Level Gauges	The Liquidometer Corp.	Long Island City, N. Y.
Motor & Solenoid Operator Valves	Bacharach Industrial Instrument Company	Pittsburgh, Pa.
	Shepard Niles Corporation	Montour Falls, N. Y.
Motor & Station Power Cables	Kerite Insulated Wire and Cable Company	Chicago, Ill.
Control Cables	General Cable Corporation	New York, N. Y.
Lighting Fixtures	The Holophane Company	New York, N. Y.
32 Volt D.C. Batteries	The Philco Company	Philadelphia, Pa.
Battery Charger	Westinghouse Elec. & Mfg. Co.	E. Pittsburgh, Pa.
Dry-Type Gas Dust Collector	Trumbull Electric Company	Norwood, Ohio

age bus can be sectionalized by means of a gang-operated disconnect switch maintaining the same degree of flexibility throughout the entire switchgear. Each side of this bus is connected to two outgoing circuits and the high voltage side of one of the transformers. At present only one main transformer is normally used, the other serving as a spare. Operation is with the bus sectionalizing switch closed.

All switch gear control is of the direct current type and power is received from a 120 volt storage battery and charger located in the plant.

Plans and specifications for the equipment were prepared by L. H. Henley, vice-president in charge of generation and distribution. The Burns & McDonnell Engineering Company prepared plans and specifications for modification of the building, hot-air heating system, fuel-unloading facilities, plant wiring, and raw water circulating system, acted as general consultants on the project, and supervised factory and field tests of the equipment. George D. Noiles is chief engineer of the plant in charge of operation and maintenance.

BIRCHFIELD BUILDS SIX STEEL TUGS DEEP IN THE HEA WO

By CHARLES F. A. MANN

As the parcelling-out process on the part of the United States Government on its vast fleet of auxiliary ships takes form, it is obvious that America will emerge in 1945 with the greatest floating tonnage of any nation in all the world; its inventors, manufacturers and shipbuilders will have brought home once more to this country all the nautical glories that America lost when the Clipper Ship era died and twenty-five years of progress in affairs Maritime will have been accomplished in just short of four years.

By summer of this year, the smaller Special Type fleet construction will be nearing flood tide, with every U. S. yard in full operation, facilities all completed, workers trained and the vast rhythm of production in full swing. The whole Pacific Coast, since April 15, has buckled down to shipbuilding on a tremendous scale.

The states of Washington and Oregon now have six giant shipyards and over 60 smaller plants building a contract-total of over seven hundred self-powered ships, plus hundreds of non-propelled barges of steel and wood, and three hundred thousand workers are now at work full speed in these cloud-covered shipyards lying at a degree of latitude ranging from Toronto, Canada, to over one hundred miles north of Montreal!

The statistic to cap all statistics for readers of DIESEL PROGRESS is the salient fact that new Diesel engines, ranging from dinky one-cylinder emergency sets in big Naval ships' lifeboats, to 1,000 hp. or larger, giants, are going into Oregon and Washington built ships at the rate of *three per day*, or more in one month than the entire American Diesel engine industry built for all forty-eight states in the last World War in six months!

Remember, in the last war, gasoline auxiliaries were the rule, not the exception. Today the reverse is true, and gasoline engines have just about disappeared from the waterfront in the Pacific Northwest. At various times we have made reference to the progress of husky Wood & Diesel construction on Puget Sound, particularly at Tacoma where the Diesel boat industry began on the West Coast.

Now we point with pride to an enterprising organization that steps boldly out in the face of King Douglas fir and puts Diesels into steel hulls, the plates for which come overland from Pittsburgh and Chicago, to be swiftly fabricated with a new brand of swift boilermaker's technique, next door to one of America's outstanding pioneer wood and Diesel shipyards and a couple of hundred feet south of two busy fir-sawing mills!

In 1936 Mr. T. A. Davies, a busy builder of fuel oil tanks for householders and oil companies who were busy littering the landscape with surplus service stations took over the ailing Birchfield Boiler Company with a huge modern covered boiler making plant, fine patents on a splendid type of welded steel household heating boiler, good mechanical equipment, but no orders and unimaginative management. This company pioneered electrically welded steel boiler construction in the Northwest, using Tacoma's notoriously cheap electric power, some 25 years ago, battling traditional opposition to welding by those who favored rivets, and marketing over a wide area, just prior to the advent of home air conditioning in the good old days of steam and hot water radiators.

Also proprietor of Tacoma Boiler Works and the Ace Furnace & Steel Company, Mr. Davies had in mind going into welded steel construction of small vessels in direct competition with wood even though wood was locally produced in limitless quantities, and expanding his commercial boiler and welding business in the matchless plant of Birchfield, where plenty of room and location were the dominating factors.

His first welded ship was a small Navy Lighter in 1939. Then followed a Coast Guard vessel for the Columbia River in 1941, previously reported in DIESEL PROGRESS and gathering courageous local capital about him, and a

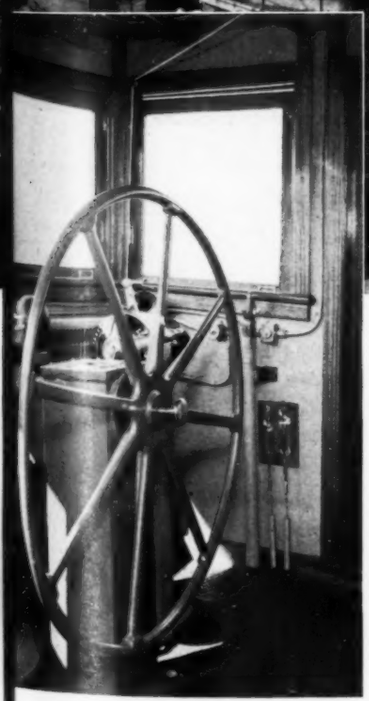
whirlwind sort of a pre-Pearl Harbor Civic Drive, landed a contract in late 1941 for 6 $300,000 Maritime Commission "Port" type steel tugs of 100 ft. length and with Diesel engines.

The most interesting part of the story concerns the ready adoption of assembly line methods to production of small welded ships. Limited to two ways due to waterfrontage problems on Port Commission leased tidelands, he hit on the idea of pre-fabrication of small complete ships sections, no heavier than crane and mechanical facilities could produce and lift in

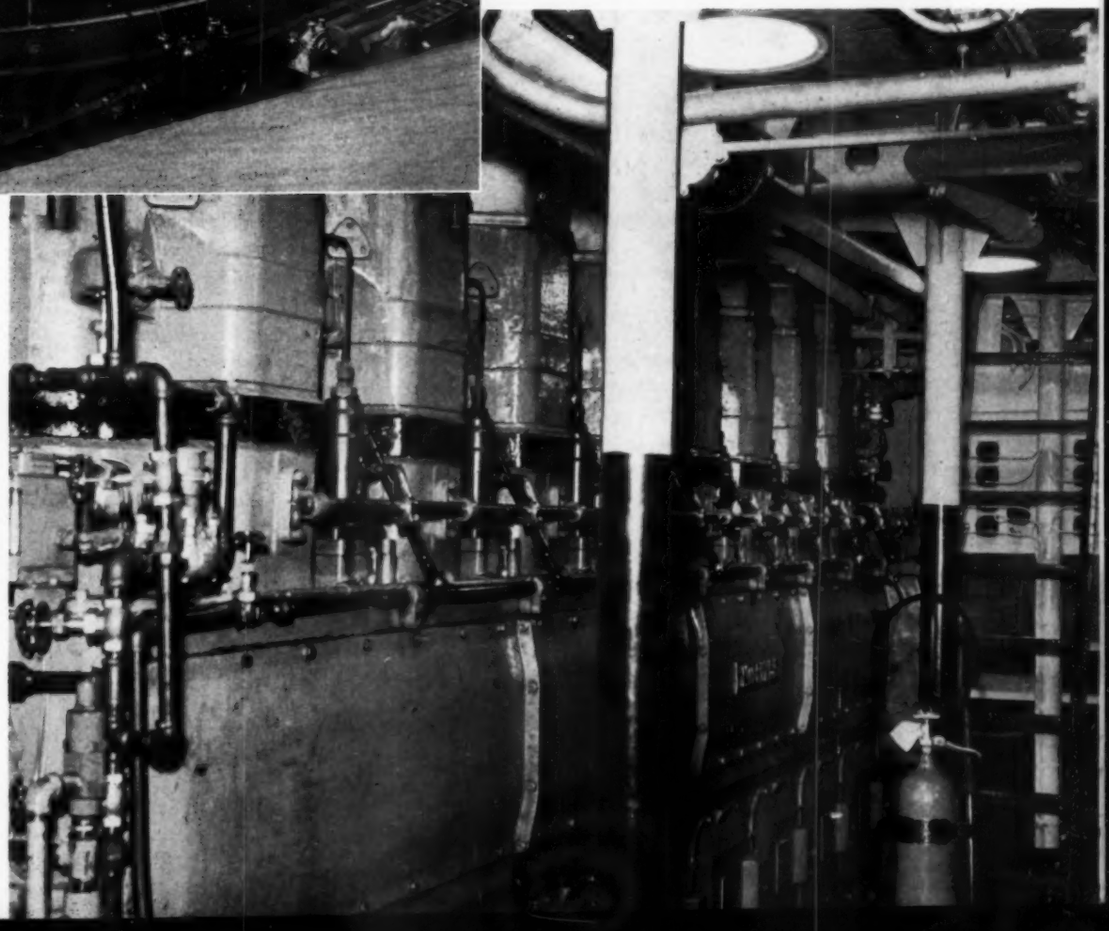
the pilot hou
echanical stee
ngine controls.

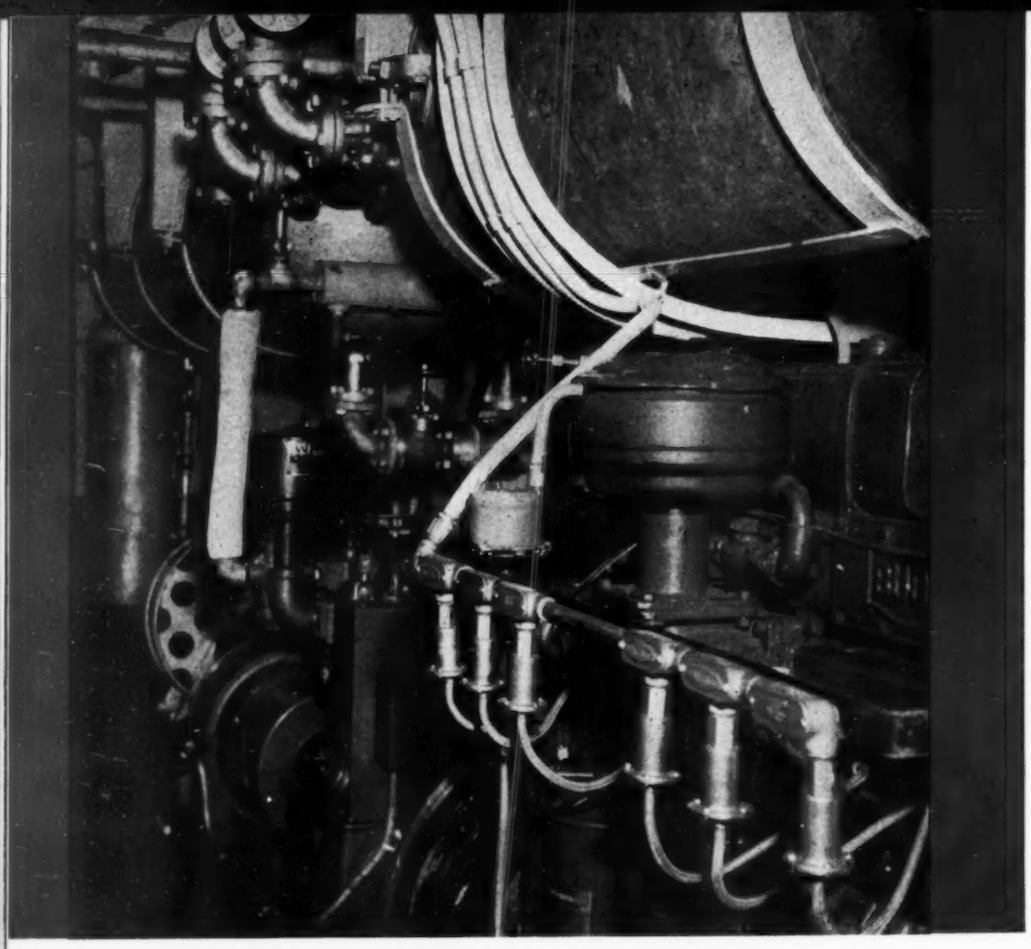
WOOD & DIESEL LAND!

Above: Tug No. 6 on trial run. Left: In this group are three of the new steel tugs and five steel freight and passenger vessels tied up at the Birchfield dock. Below: An Enterprise, 8 cylinder, 1,000 hp. Diesel powers each of the six new tugs.



n the pilot house are Sperry Electro-echanical steering gear and main ngine controls.





Buda-Lanova Diesel auxiliary generating sets, as shown, are installed on the six new Birchfield-built steel tugs.

the form of the larger models of Birchfield boilers, rolling the steel into the west end of the plant on two railroad tracks which run directly into the plant, fabricating, cutting and pre-assembly as the parts grow larger, and moving them eastward through the plant to the building ways. At one time he had his system geared up so that the double bottom sections, bulkheads, bow sections, tanks and stern assemblies moved so fast that two rapidly growing tugs were on the outer end of the launching ways and two more on the upper end, all under the spacious cover of the huge main building—literally 1/5 of the main building covers the ways—the rest of the building covers the shops—four hulls in all.

As fast as the tugs were commissioned, the Maritime Commission turned them over to the Navy, changed or eliminated names and then sent them back to Birchfield to have Navy equipment, gun mounts, etc., installed.

Originally named the *Port Angeles, Port Discovery, Port Blakeley, Port Ludlow, Port Orchard* and *Port Madison*, after famous smaller Puget Sound ports, these six tugs are unnamed Naval District harbor tugs, busy moving larger warships about harbors and Naval bases, towing barges, lighters, etc., up and down the coast as far south as San Diego.

For practical purposes this story concerns Number Six, last of the series, from which illustrations were made, and each tug is identical in every respect.

They are 100 ft. long, 25 ft. beam and 11 ft. 6 in. draft aft and 5 ft. 6 in. draft forward, and have 435 tons gross displacement. Their average speed as tabulated by the Navy on official trials was 12.4 knots. All quarters for crew and officers are on the main deck. No towing winch is provided due to their peculiar type of work, and everything is steel except a very few built ins, which are made right in the Birchfield joiner shop, and certain doors, etc. They are easy to maneuver, have full pilot house control, including an upper pilot house or navigating bridge and are easy to hook on to heavy loads.

Main power consists of a new, heavy duty type of 8 cylinder, direct reversing, Enterprise Diesel engine, turning 300 rpm. and delivering 1,000 maximum horsepower on the shaft. A 3-bladed Enterprise-furnished, Coolidge bronze propeller, 7 ft. 6 in. in diameter, driving through a Kingsbury thrust bearing built into the after end of the engine, and a hollow, balanced steel rudder, operated by a Sperry electric motor steering gear, equipped for hand or power steering, is the propulsion setup of these tugs. The Enterprise Diesel is 20 inch stroke and 16 inch bore, with air starting for each cylinder, weighing 102,000 lbs. and has an overall length of 28 ft. 3¼ in. The tops of the cylinder heads just touch the main deck level.

A 40 kw., 6 cylinder Buda-Lanova Diesel auxiliary generating set, and belt driven generator are fitted, together with an Ingersoll Rand 2 cylinder auxiliary air compressor driven off the Buda set, and an Ingersoll Rand auxiliary air compressor motor driven, and I-R auxiliary water, oil, bilge, fire and service pumps throughout. Ingersoll Rand fresh water cooling system is provided for the main Diesel, with emergency saltwater connections.

Briggs oil clarifiers, Enterprise pilot house controls, Alnor pyrometers in the engine room and pilot house and Weston tachometers are fitted also. A Lux CO2 firefighting system by Walter Kidde, with 11-50 lb. bottles and 5-15 lb. portable bottles provided in the setup.

A large size York oil burning heating boiler is provided for heating in cold Alaska climate; four 30 in. x 10 ft. 6 in. air bottles, giving 21 starts per bottle if necessary, give ample air capacity for maneuvering the largest battlewagon safely into a Navy drydock or pier and the famous Webster Brinkley capstan, motor driven, is fitted on the deck.

Fuel storage for 29,000 gallons is provided in deep tanks and double bottom tanks and a 2-way radio is fitted. Crews quarters for 9 men and the captain and engineer are comfortably fitted out. The gallery has a Shipmate oil fired range and large 8 cubic foot Frigidaire, by General Motors. Every piece of galley built in is of sheet steel, enamelled, built right on the spot by Birchfield, making the ship as nearly fireproof as possible.'

Hull No. 1 had the honor of warping Destroyer Hull No. 1 from the Seattle plan of Seattle-Tacoma Shipbuilding Corp. into her outfitting berth at Bremerton, both having arrived by coincidence the same morning last winter at the Navy Yard there. Hull No. 4 successfully underwent a gruelling maiden voyage with a heavy tow from Astoria, Oregon, down to San Diego, without a pause or a bit of trouble. Birchfield is now busy on fourteen 99 ft. Army freight boats also of welded steel construction.

Exchange Your Diesel Maintenance Ideas

Conducted by R. L. GREGORY

Editor's Note: In this department we provide a meeting place where Diesel and Gas engine operators may exchange mutually helpful maintenance experiences to keep our engines in top condition. Mr. Gregory edits your material and adds constructive suggestions from his own wide experience. This is your department—mail your contributions direct to DIESEL PROGRESS.

"The Value of Inspection and Maintenance"

THE following contribution was sent to us by Mr. Merle J. Miller, Superintendent of the Board of Trustees of Public Works, of Bryan, Ohio. In this article he describes what their plant is doing in the way of improving maintenance during our present war period.

"We as producers of Utility service are endeavoring in our plant to render a continuity of service to the general public, and especially to those manufacturing plants, which are dependent upon us for their power, in the production of vital war equipment. Hence we are beginning to realize the importance of more frequent inspection periods and the dire need of maintaining equipment, in order to secure additional longevity from that equipment, because it is generally conceded that our present world-wide conflict is far from being ended.

"The critical shortage of repair parts, and other materials has caught many of our plants with repair stocks on the declining side. In pre-war days we were always able to call upon the manufacturer for repair parts and within a few days, sometimes hours, delivery of the required parts was made at our doors. But the picture has changed and the manufacturer finds himself in much the same predicament that we are in. He is just as eager as ever to give us prompt service, but finds himself deluged with Government orders, in many cases demanding his entire output. Therefore we have been thrown practically upon our own resources.

"In our particular plant, weekly, monthly, semi-yearly and yearly inspections have become the order of the day, and I will try to give the readers of DIESEL PROGRESS in a limited space, some idea of what we try to accomplish to improve our maintenance and keep our equipment in good operating condition.

"The Maintenance crew as well as the Operating force have become conscious that this routine inspection plays an important part in plant operation and in reducing forced shutdowns to a minimum. The Operator on shift is partially responsible for the proper functioning of the units in service. Any irregular operation of a unit is reported by work order to the Maintenance crew who then become responsible for repairs to the unit in question. From this type of operation many constructive suggestions have been offered by the personnel who are in constant contact with these units. Some of these are illustrated as follows:

(A) Oil Seepage.

"In one particular case it was found that a considerable amount of oil from the crank case was seeping out around the inspection doors, causing a waste of oil and frequent wiping of the engine proper. An investigation was made, and we found that by creating a small amount of vacuum in the crank case we could eliminate this trouble. To create such a vacuum we connected a pipe from the crank case, through a small breather, mounted externally and back into the air intake pipe ahead of the blower. A drain pipe was then connected from the breather reservoir back into the crank case. With this arrangement two things were accomplished, first we eliminated the seepage, since a vacuum of from one to one and a half inches was maintained in the crank case, and secondly we saved on wipers and labor, only a small percent of the wipers and time formerly spent on the unit now being necessary to keep it clean.

"We also found that this arrangement acts as a tell-tale on the condition of our air filters. When the vacuum rises over and above the normal one to one and a half inches in the crank case, it indicates that the air filters are becoming dirty and need attention.

(B) Fuels and Lubricants

"We now give fuels and lubricants more consideration than formerly, since greater demands are placed on the machines due to increased loads. Lubricating oils are subjected to greater strains and stresses than ever as in most cases units which ordinarily carried normal loads are now expected to carry full loads and in some cases overloads for short periods of time, thus causing higher temperatures. As we all know, fuel oil as well as lubricants play an important part in the operation of a plant and if we expect to get the maximum life out of rings, cylinders, liners and fuel equipment it is to our advantage to use good clean fuel and lubricants. In our plant the fuel is not centrifuged as we are buying a good clean fuel. Our lubricants are reclaimed by a continuous filtration system, which even though the units may be idle, the filtering process is in continuous operation. We have had excellent results from this procedure, temperatures on these units are from 160 degrees F. minimum to 170 dgrees F. maximum.

(C) Unit Operation

"Several months ago we experienced, an unusual incident while starting one of our large Diesels for the day's operation. The Operator on shift prepared to start the unit as usual. The starting throttle was placed in starting position, allowing the air to flow through to the starting cylinders, which in turn put the unit in motion. He then threw the throttle to the running position, and immediately an explosion occurred and small pieces of casting were thrown helter skelter about the unit. He immediately pulled the throttle back into the stop position and shut the unit down, and investigated. This investigation showed that four atomizer casings were damaged at the point of entry of the air pipe to the casing. The atomizing equipment was removed and it was found that the atomizer rings and cones were also damaged. The cause of this explosion and the resultant damage was checked from various angles, and we finally concluded that the blast air pressure was lower than the compression, allowing fuel to be blown into the air line through the injection nozzle, causing the explosion to take place in the injection nozzle instead of in the cylinder. Evidently the operator has not checked his blast air pressure before starting up. The unit was placed back in operation after repairs were made and you can be sure that the blast air pressures are now checked before any unit is started.

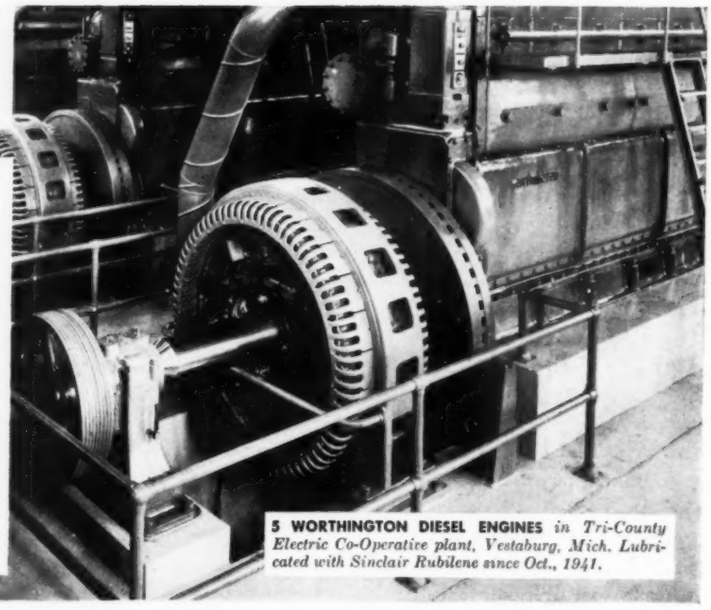
. . . . *And now please turn to page 58* . . . .

Official U. S. Navy Photograph

BIG PUSH ABROAD needs all-out support at home. For sustained delivery of full *DIESEL* engine output use . . .

. . . . . SINCLAIR RUBILENE OILS. Rubilenes' high film strength gives safe lubrication under heavy duty operation. The stability of these oils promotes clean, cool running and longer periods of continuous operation.

Write for "The Service Factor"—a free publication devoted to the solution of lubricating problems.



5 WORTHINGTON DIESEL ENGINES *in Tri-County Electric Co-Operative plant, Vestaburg, Mich. Lubricated with Sinclair Rubilene since Oct., 1941.*

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THE DAILY LOG SHEET

By R. L. GREGORY*

IN THE OPERATION of any Power Plant, one of the most important items to be considered is a record of Plant Operation. This feature of your plant operation can best be taken care of by means of a Daily Log Sheet, which should be accurately and neatly kept, and filed away for future reference.

In compiling a Daily Log Sheet, several points must be considered. The type of sheet and size depends almost entirely upon the type of equipment which you have in the plant, and the amount of information you desire to keep as a permanent record. To illustrate this point we are showing in the accompanying cuts, several types of Daily Log Sheets.

That shown in Figure #1 is the Daily Log used by the Carthage, Mo., Water & Electric Plant, which is one of the finest all-Diesel Plants in the country. This Log Sheet is complete in every detail and covers the operation, maintenance and conditions of four units and all the accessories, such as pumps, heat exchangers, temperatures of the units etc. In addition you will note that a record is kept of the distribution meters, lighting, water pumped, fire alarms, oil storage, lubricating oils and weather conditions. Such a record properly kept, gives all that is to be desired in the way of plant conditions and operation, and all records are recorded on one large sheet.

Figures #2 and #3 are the Log Sheets as used by the all-Diesel plant of the City of Grand Haven, Michigan. These records are also complete in every detail and cover their five large Diesel Units, very completely. In their particu-

. . . . *And now please turn to page 56* . . . .

**Superintendent, Hillsdale City Light & Water Plant, Hillsdale, Michigan.*

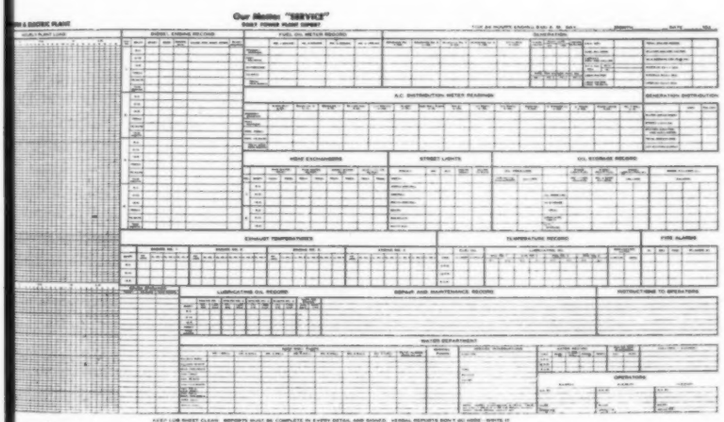
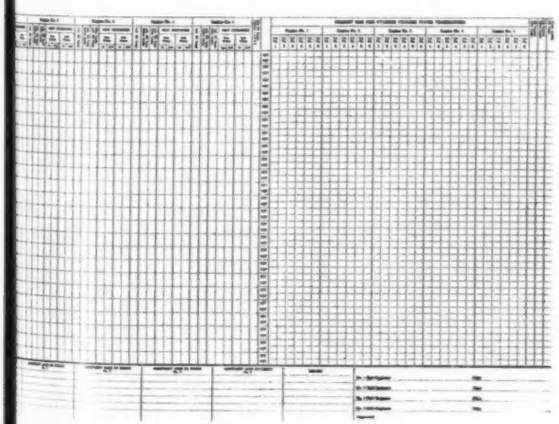
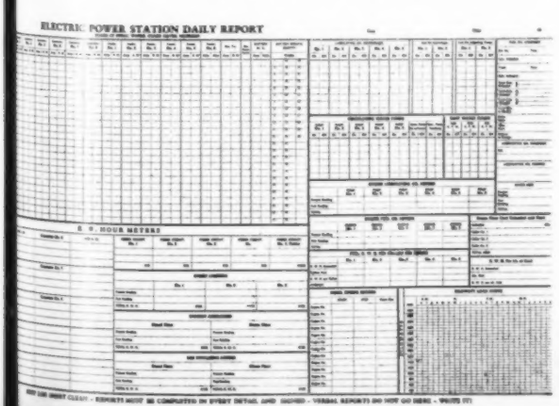


Fig. 1 →



← *Fig. 2*



← *Fig. 3*

Fig. 4

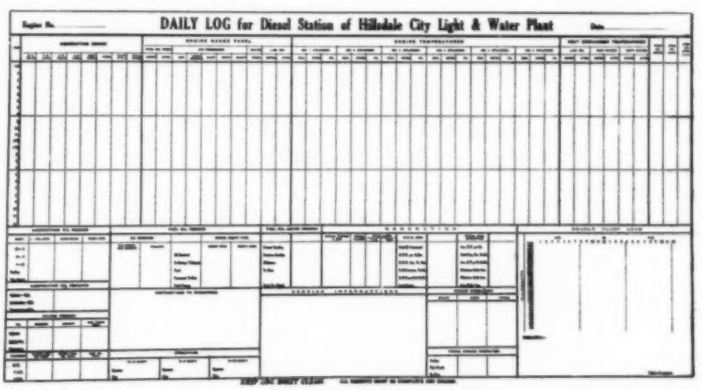


Fig. 5 →

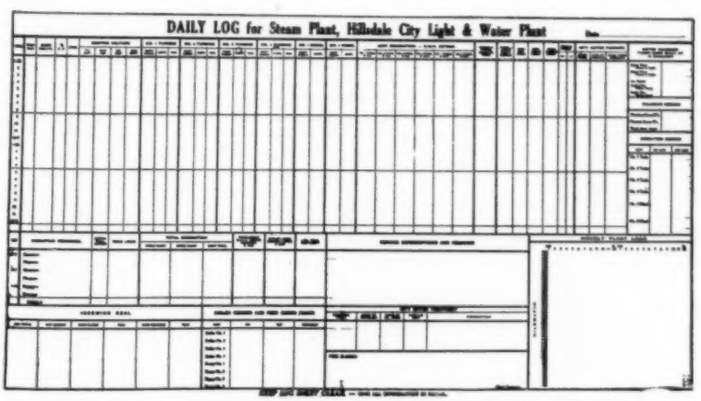
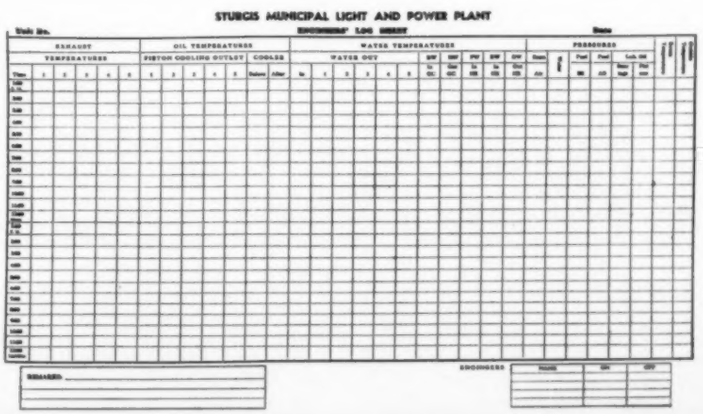
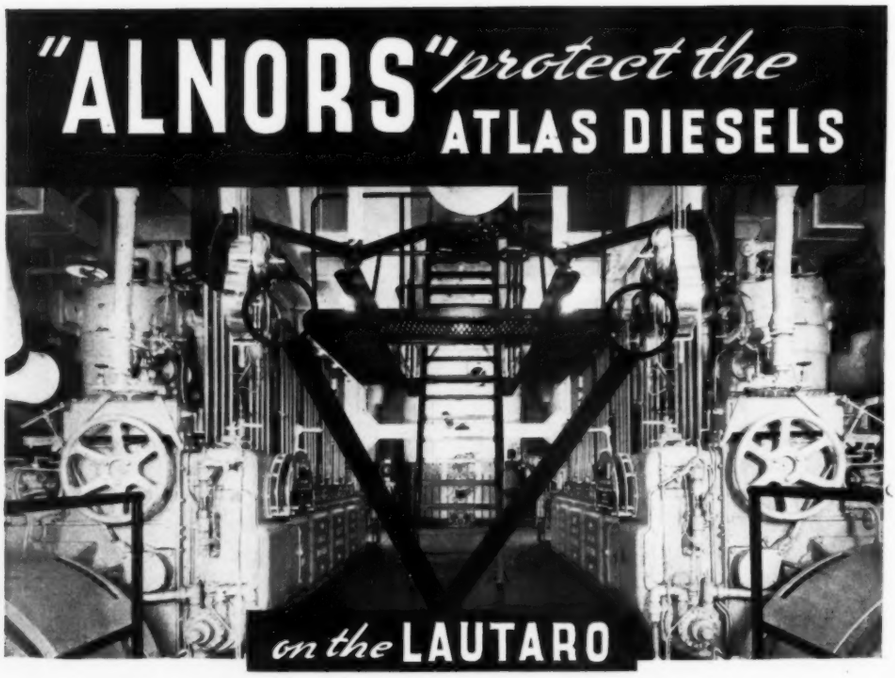


Fig. 6 →

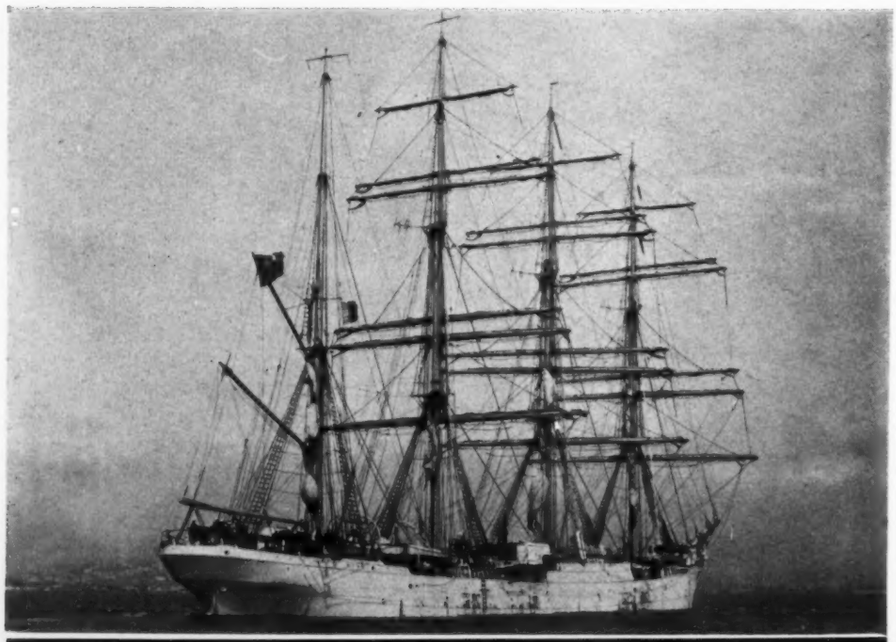




Twin Atlas Diesels with a pair of engine-mounted "Alnors" give the Chilean Naval training Barkentine Lautaro assured power when she furls her sails and wants to go places. The Chilean Navy picked the best of American-made machinery and equipment for this auxiliary Diesel sailer—including "Alnor" pyrometers.

●

Specify and Buy "Alnor"



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Engineers' Section

. . . . *Continued from page 55* . . . .

lar case they use both sides of the Log Sheet and go a little more into detail on each particular unit.

Figures #4 and #5 show the Daily Logs as used by the Hillsdale, Michigan Municipal Power Plant. This plant is a combination Diesel and Steam Plant. The Diesel Log Sheets are also complete in every detail but are so arranged that a separate sheet can be used for each engine as necessity may demand. Since in this particular plant all distribution is taken care of in the steam plant, no distribution details are necessary on the Diesel Log, that Log being confined entirely to Diesel operation. The steam plant log, covers operation of the steam plant but also gives generating details of the Diesel plant and therefore complete generating details of both plants are recorded on the Steam plant log, there being a duplicate set of instruments covering the Diesel plant on the Steam plant switch board.

Figure #6 is a more simplified form of a Daily Log as used by the Diesel Plant at Sturges, Michigan. This Log Sheet covers a single unit, each unit therefore having its individual Log Sheet. However in the case of this plant, their Daily Log Sheet is supplemented by additional sheets covering auxiliaries, oil storage etc. and are not as elaborate in detail as those of the other plants. This plant is also augmented by a hydro station located some distance from the Diesel plant, and separate daily logs are kept at this plant covering the hydro plant only.

In glancing over these Daily Logs, one can note the amount of information which they contain. While the larger plants go into detail on their units, all the information logged is vital to good operation. Of course there is such a thing as overdoing it, and when one is preparing his log sheet he must keep in mind, that simplicity makes for more accurate records, but at the same time he must have all the information vital to good operation.

Possibly the most important part played by a well kept log sheet is the information that is obtainable from such a sheet at some future date. When these log sheets are properly filed by years, one can easily refer to them and make comparisons which are most vital in the planning of future plant growth and requirements. They also serve as a guide to maintenance and when adjustments and maintenance, such as replacement of major parts are logged, those in charge of the plant have a complete record

WHAT!

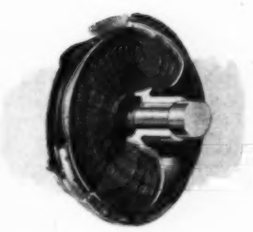
FLUID DRIVE A SUB?

LONG BEFORE you could buy an American built motor car equipped with Fluid Drive, American Blower Fluid Drives were used in submarines by the U. S. Navy.

The Fluid Drive on a boat has many important advantages . . . It prevents transmission of torsional vibrations and shock from powerful Diesels to delicate machinery, synchronizes multiple engine speeds; permits rapid clutching and de-clutching and provides other equally important advantages.

Today, because Navy officials knew you could FLUID-DRIVE a sub, American Blower Fluid Drives are extensively used on many types of Navy craft. To American Blower's highly skilled engineering and manufacturing personnel have come many important assignments for Victory. And American Blower's extensive facilities for manufacture, fabrication, welding, processing, assembling, have been taxed to capacity.

After Victory, the skill, experience and proved manufacturing ability of American Blower will be available to promote the peace and prosperity of a free world.



Cutaway view of American Blower Fluid Drive. There is no mechanical connection between driving and driven members.

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Exchange Maintenance Ideas

. . . . *Continued from page 53* . . . .

(D) Intercooler Trouble

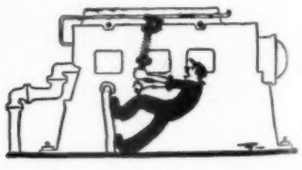
"Another experience which we had and which might be of interest occurred to one of the high pressure coils connected to the intercooler. The flare on one end of a high pressure coil straightened out, allowing the end of the cooling coil to slip back through the cinch ring and nut, and thus become disconnected from the intercooler proper. When this occurred it allowed the high pressure air, at approximately 1000 lbs. pressure to escape into the intercooler chamber, with a result that the end section of the intercooler shell ripped apart at the welded seam. Considerable time was consumed in making this repair, as the shell was badly distorted and had to be repaired and rewelded.

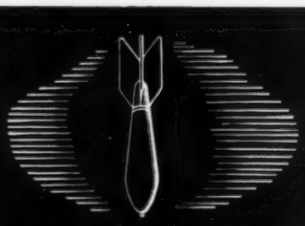
"To prevent an recurrence of this accident, we placed the cinch nut back on the coil, then replaced the cinch ring which is a band 3/16" thick by 3/4" wide around the coil and reflared the end. As an experiment we made a new cinch ring of steel, the old one being of brass, and brazed the steel ring directly onto the copper coil, hoping that this would eliminate any future trouble with the coil pulling out.

"Such experiences as these in months past have awakened us to the absolute need of constant inspection and maintenance and renewed efforts in keeping our equipment in good mechanical condition."

The writer is well acquainted with the plant which Mr. Miller has under his supervision, as it is one of the fine Municipal Diesel Plants in Ohio. In referring to the above paragraph on Oil Seepage, the method adopted by Mr. Miller has been used to good advantage in several plants. Mr. Miller did not state in his letter as to just how he determined the vacuum maintained in the crank case, but most plants check this by means of a manometer, located somewhere conveniently on the side of the unit with connections leading from the crank case to the manometer.

His experience with intercoolers has occurred in other plants and in the December 1942 issue of DIESEL PROGRESS on Page 62, there appeared an article with a cut showing how these coils and intercoolers should be arranged and maintained. Mr. Miller stated that he experimented with a steel cinch ring, which the writer feels might be an improvement over the brass ring formerly used, providing it is inspected often. Steel is much more susceptible to oxidation and may rust and pit much more than brass, therefore will need more frequent inspection. Again I am wondering what effect brazing this ring to the copper coil may have. The cinch ring function is just what its name implies and in order to cinch the coil tightly in place it seems that it should be free to slide upon the coil and let the cinch nut do the holding of the cinch ring in place. When brazed upon the coil it seems that all the strain would be placed directly on the copper coil, and any tendency toward vibration might crystalize the copper coil at this point and cause more frequent cutting and leakage. However this is just an opinion and we will be interested in hearing from Mr. Miller later as to how this method of fastening coiling coils in intercoolers works out.





Who Wins Wars?

Strangely enough, the average man does! Much as we all detest war the fact is that under its stimulation a nation always develops new products with infinite peacetime applications. To date, scores of fantastic devices have been created for war purposes which one day will contribute mightily to the American Way of Life. Weatherhead is producing at the rate of *millions every day* many products that have peacetime application. Just as we've helped build cars, planes and refrigerators in the past, Weatherhead will help you build these amazing new products of tomorrow.

Look Ahead with

Weatherhead

THE WEATHERHEAD COMPANY, CLEVELAND, OHIO

Manufacturers of vital parts for the automotive, aviation, refrigeration and other key industries.

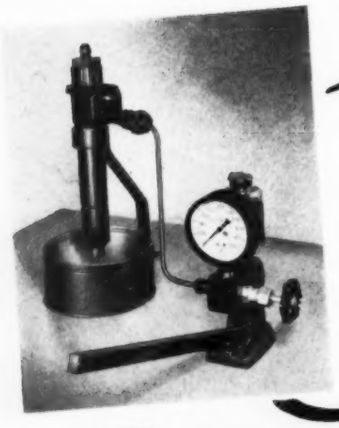
Plants: Cleveland, Columbia City, Ind., Los Angeles
Canada—St. Thomas, Ontario

WANTED—Operators of Diesel Generator Sets interested in scientific analysis of operating problems, enabling them to produce more K. W. hours on less maintenance. Those interested apply for experimental service without cost or obligation.

CITIES SERVICE OIL COMPANY

Room 1625 70 Pine Street

New York, N. Y.



ADECO NOZZLE TESTER
For Economical Maintenance

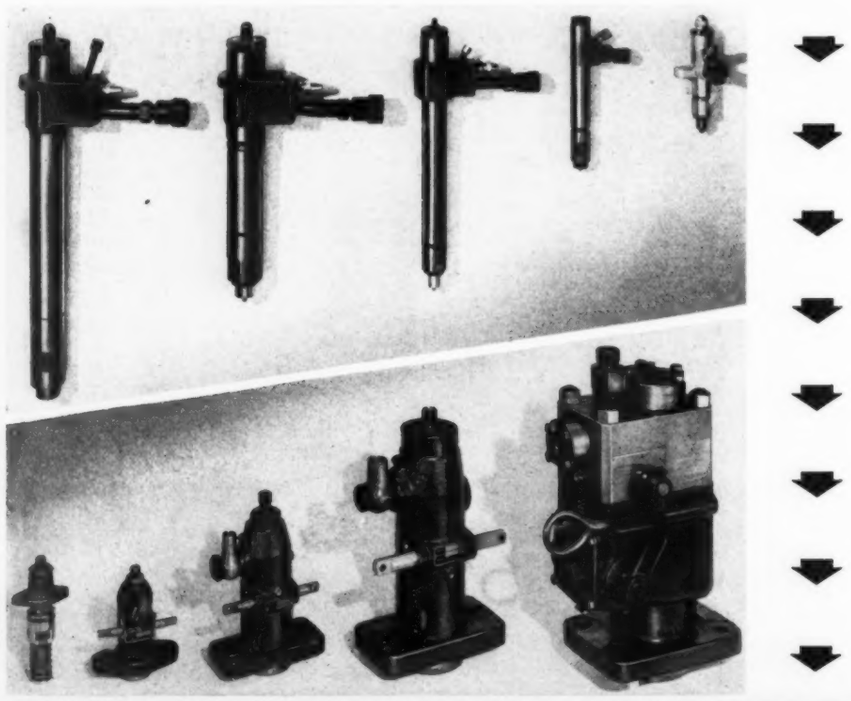
America's most widely used Nozzle Tester enables any mechanic to make quick, accurate tests on injector opening pressure, spray pattern, etc., and detect stuck needle valves and leakage around valve seats. Compact, portable, sturdy, precision-built. Pressures up to 10,000 p.s.i. Tests both large and small injectors. Avoids costly delays and possible damage to engine. Best for economical maintenance. Write for new illustrated bulletin.

ADECO "KNOW-HOW"

BRINGS YOU THE FINEST IN DIESEL FUEL INJECTION EQUIPMENT

Back of every Adeco product is a thorough knowledge of diesel requirements, gained through years of experience in serving the diesel industry. This understanding combined with Adeco's wide research and manufacturing facilities provides a most dependable source for the finest in diesel fuel injection pumps, nozzles and nozzle holders.

Write for complete Adeco Catalog



AIRCRAFT & DIESEL EQUIPMENT CORPORATION
4401 NORTH RAVENSWOOD AVENUE • CHICAGO, ILLINOIS

. . . . *Continued from page 40* . . . .

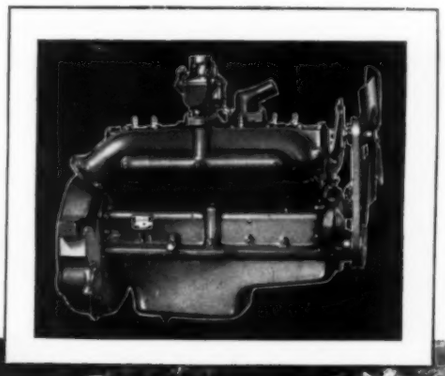
stranded in the field.

The second approach lies in the training courses at the various Diesel engine schools. In most of these courses emphasis has been placed on training the student how physically to replace worn parts. Seldom has he been shown real examples of worn parts that must be replaced and real examples of worn parts that should not be replaced. We must inculcate in these students the burning need for conservation of spare parts. We must reach them by some method and give them the will and the confidence to use wearing parts until they begin to impair the safe operation of the engine.

While I am on the subject of schools, I want to pay the highest tribute to the many companies represented here tonight who have fostered schools at their factories. Training centers have been established in many colleges throughout the country, in the plants of most engine builders – Cleveland Diesel Engine Division boast a very good one—in Miami, on Chicago Pier, etc. These schools have been well equipped with engines and engine accessories. Their greatest assets are the instruction books published by the machinery manufacturers. Instruction books of the most comprehensive kind, well printed and profusely illustrated, comparing favorably with standard text books, have been furnished by most engine builders. Navy suppliers have been competing for excellency in this respect for years, and, Gentlemen, this competition has paid high dividends. A good instruction book is a public record of pride. It is a human sort of an instrument because it makes the operator feel he has been taken into the confidence of the manufacturer. Our training program would have been hopelessly impotent without these fine documents.

While training of personnel is of the utmost importance, it must be recognized that of equal importance is the process of continuously testing all the different engines installed in Naval craft under controlled conditions and expert supervision. The Bureau of Ships does this at the Engineering Experiment Station at Annapolis. Here scores of engines of all types undergo life tests to determine their endurance and any necessary improvements before they are released to the Service. The Experiment Station is fully apprised at all times of new operating conditions that the engines are expected to encounter in service. Special research on bearings, piston rings, lubricating oil, etc. is continuously going on there to reduce wear

WHERE THE NAVY HAS TO NAVIGATE RUGGED TERRAIN



...a WAUKESHA ENGINE powers this *Available* Six-Wheel Wrecker built for Naval Ammunition Depot

★ Any job that the Navy gives to a wrecker anywhere around a naval ammunition depot is a tough job. Whether it's handling big shells . . . huge guns . . . or one of the many general utility jobs . . . it's always heavy hauling!

But when the terrain around that depot is "rugged" that wrecker had better be built like a battleship *and powered accordingly.*

This six-wheeler is. Specially built by Available Truck Co., Chicago, for this particular Navy job . . . it is *powered with a Waukesha Engine.* Super-power . . . smoothness . . . speed . . . stamina—with dependability.

That's why Waukesha Engines power so many war vehicles of the very latest type.

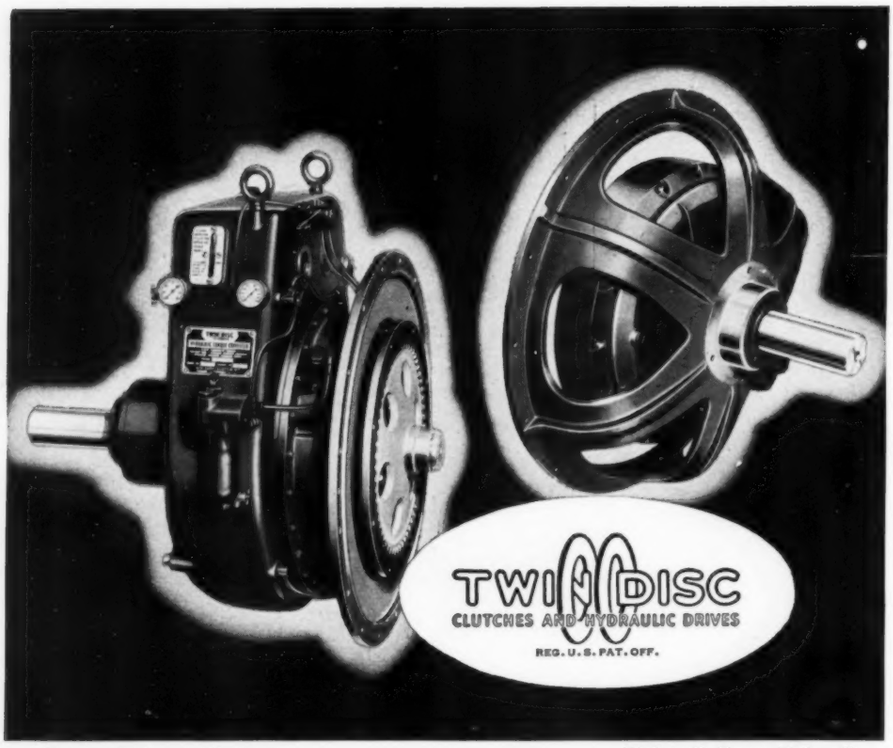
For Automotive, Industrial and Stationary Power, Waukesha Gasoline and Oil Engines range from 5 hp. to over 300 hp. Get Bulletin 827.

WAUKESHA MOTOR COMPANY, WAUKESHA, WIS.
NEW YORK • TULSA • LOS ANGELES

★ ★ ★ FOR VICTORY . . . BUY WAR BONDS AND STAMPS ★ ★ ★

MORE POWER FOR VICTORY

WAUKESHA ENGINES



Hydraulic Torque Converter (Lysholm-Smith Type)

Hydraulic Power Take-off

WHAT'S *Your* BIG IDEA?

After-the-war products are certain to be revolutionary in their conception. Hints of new things on the drawing board forecast tools, implements and machinery that will immediately obsolete the equipment now in operation.

Closely allied with these new products is the apparent wide application of hydraulic drives. Wherever a driving and a driven unit must be linked together and a smooth, steady flow of power is vital, engineers are investigating the two types of hydraulic drives offered by the Twin Disc Clutch Company.

1. The Hydraulic Torque Converter (Lysholm-Smith Type)
2. The Hydraulic Coupling

Each of these provides a connecting link that cushions cyclic variations and shock loads. Each has the advantage of picking up the load without the need of gear shifting, but ONLY the Hydraulic Converter has the added advantage of providing torque multiplication (approximately five times the engine's torque). Thus, with the Torque Converter, heavy loads that would be beyond the engine's capacity to start without resorting to gear shifting are smoothly and easily handled. No jerking . . . no snapping of lines or cables . . . no sudden shock loads which might stall the engine.

Why not ask the Hydraulic Division, Twin Disc Clutch Company, Rockford, Illinois, for full particulars? A competent engineering department invites your question.

TWIN DISC CLUTCH COMPANY • RACINE, WISCONSIN

. . . . *Continued from page 60* . . . .

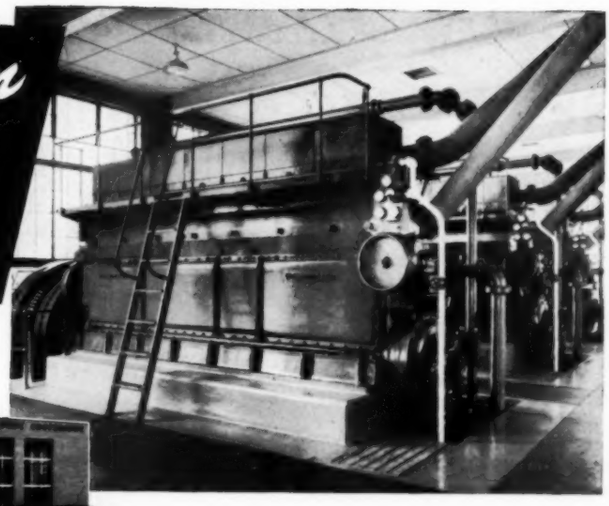
and tear of the engine parts in service and to aid in the quick determination of any trouble afloat. The Station's services and experts are at all times accessible to the industry. Close cooperation with this institution cannot fail to be beneficial to the development of the Diesel engine.

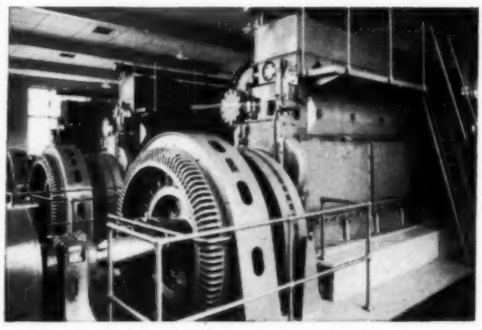
This brings me to another plea to the engineering fraternity and to the Diesel industry. As a nation, we must encourage only the best to survive. Hence, most of the peculiar whims and hobbies of an individual engineer or an organization must of necessity be permitted to make room for the fittiest.

The war has taught all of us the advantage of standardization. Mass production is impossible without it. As I envision the future, American Industry must organize around mass production procedure. The old job shop is no more, because the rest of the world is just waiting to out "job shop" us, hoping we will play according to those rules. We simply must not go back to minor league tempo. The members of this society must take their hair down, bury the hatchet in certain cases, and go to work based on a global horizon.

One other thought and I am finished. I want to speak about the gas turbines. For years this new type of prime motor was in the same category as the Bumble Bee. Both were classified by the scientists as "incapable of survival"—the bee because it could not fly, and the gas turbine because no thermodynamic cycle could be devised to make it competitive with the internal combustion engine. Fortunately, the Bumble Bee escaped and flew ever since. Lately there was another upheaval in the alchemists' laboratory. The gas turbine discovered that it did not need a new cycle. In desperation, the French Inventor, Houdri, gave it the job to save his hydrogenation process, and it did just that beautifully. Today, it already plays a very important role in providing gasoline, if not for you and me, at least for Uncle Sam's air force. Recently it made its debut in a railroad locomotive, and the United States Navy is now actively developing it as a future propelling plant for war vessels. Although there is nothing more concrete than I can report at this moment, I am positive that the gas turbine will soon become a firm reality, and probably it will open up a new era in power production. It still provides a most challenging incentive to the metallurgist to create a material that will stand up in hell if need be. Like television, it is just around the corner.

Here's a Pattern FOR COMMUNITY POWER





DIESEL ENGINES 150 to 1500 hp.

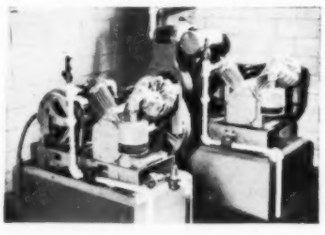
GAS ENGINES 175 to 2880 hp.

CONVERTIBLE GAS-DIESEL ENGINES 150 to 1500 hp.

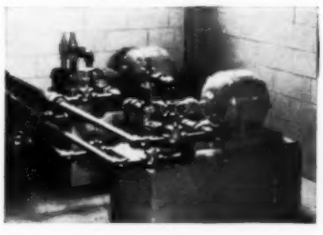
An interesting example of rural community power planning, in cooperation with the Rural Electrification Administration, is the recently completed plant of the Western Michigan Electric Cooperative.

Here three Worthington 595-horsepower fully-enclosed diesel engines, driving synchronous generators, furnish economical power to nearly 1200 consumer-members on 340 miles of line. With its integrated Worthington auxiliary equipment as an assurance of uninterrupted operation, this station is regarded as a model of completeness and advanced methods. Now doing its part in providing power for war services, it stands ready to meet the expanded post-war needs of a forward-looking community. No section of the country is too remote for this kind of modernization.

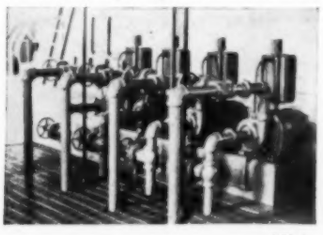
Air compressors for starting



Rotary pumps for fuel oil transfer



Centrifugal pumps for jacket water circulation



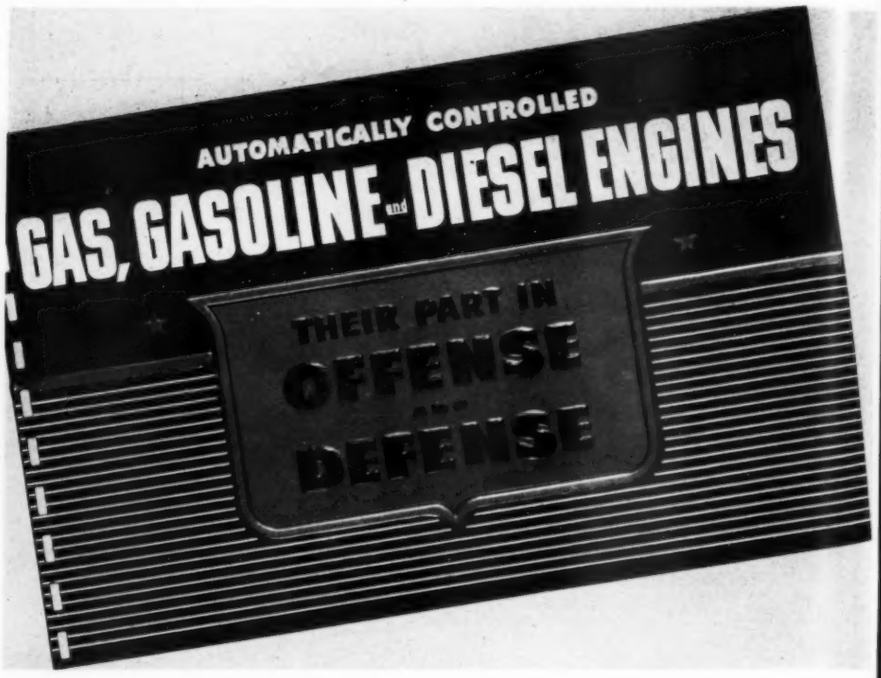
DE3-4

WORTHINGTON

WORTHINGTON PUMP AND MACHINERY CORPORATION • HARRISON, NEW JERSEY

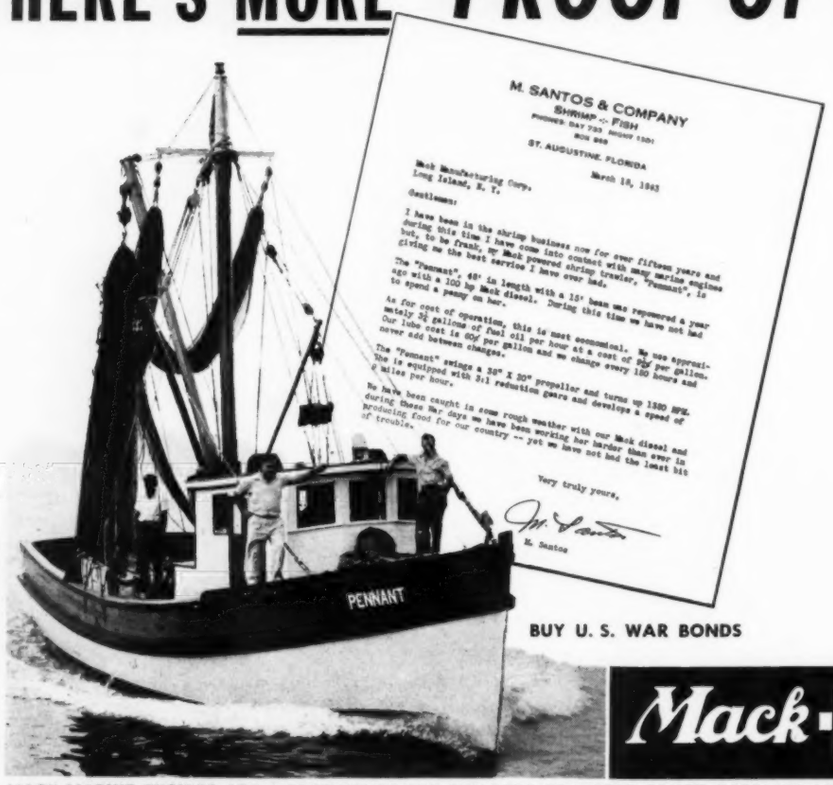
Synchro-Start Issues Noteworthy Booklet

IN a colorful booklet just issued, Synchro-Start Products, Inc., of Chicago, Illinois, sets forth many of the currently describable applications of automatically controlled internal combustion engines. It is implied, of course, that the military services are employing Synchro-Start controls in many situations that cannot at present be revealed. Illustrated, however, in this thirty-two-page, 4-color booklet are such interesting applications of automatically controlled engines as highway underpass flood control pumping units; emergency power units on naval and commercial vessels; central station and industrial plant standby units; locomotives, buses and trucks; refrigeration and air conditioning units; draw bridges, etc. Of timely interest is the use of automatic controls to start and stop power units at predetermined temperatures to insure availability of vital energy in arctic military advance bases. A copy of this informative booklet will be mailed upon request to Synchro-Start Products, Inc., 221 East Cullerton St., Chicago, Ill.



The attracive cover of Synchro-Start Products' new booklet, done in black, white and gold, pays tribute to internal combustion engines in the war effort at home and abroad.

HERE'S MORE "PROOF OF THE PUDDING"


M. SANTOS & COMPANY
SHRIMP — FISH
ST. AUGUSTINE, FLORIDA
March 18, 1943
Mack Manufacturing Corp.
Long Island, N. Y.
Gentlemen:
I have been in the shrimp business now for over fifteen years and during this time I have come into contact with many marine engines but, to be frank, my Mack powered shrimp trawler, "Pennant", is giving me the best service I have ever had.
The "Pennant", 48' in length with a 15' beam was repowered a year ago with a 200 hp Mack diesel. During this time we have not had to spend a penny on her.
As for cost of operation, this is most economical. We use approximately 3½ gallons of fuel oil per hour at a cost of 6¢ per gallon. Our lube cost is 60¢ per gallon and we change every 150 hours and never add between changes.
The "Pennant" swings a 36" X 30" propellor and turns up 1320 RPM. She is equipped with 3:1 reduction gears and develops a speed of 8 miles per hour.
We have been caught in some rough weather with our Mack diesel and during these war days we have been working her harder than ever in producing food for our country -- yet we have not had the least bit of trouble.
Very truly yours,
M. Santos
PENNANT

BUY U. S. WAR BONDS

FROM THE SHRIMP TRAWLER "PENNANT"!

Mack Mariner Diesels are built specifically for marine operation, and they're built to the highest standards in the industry.

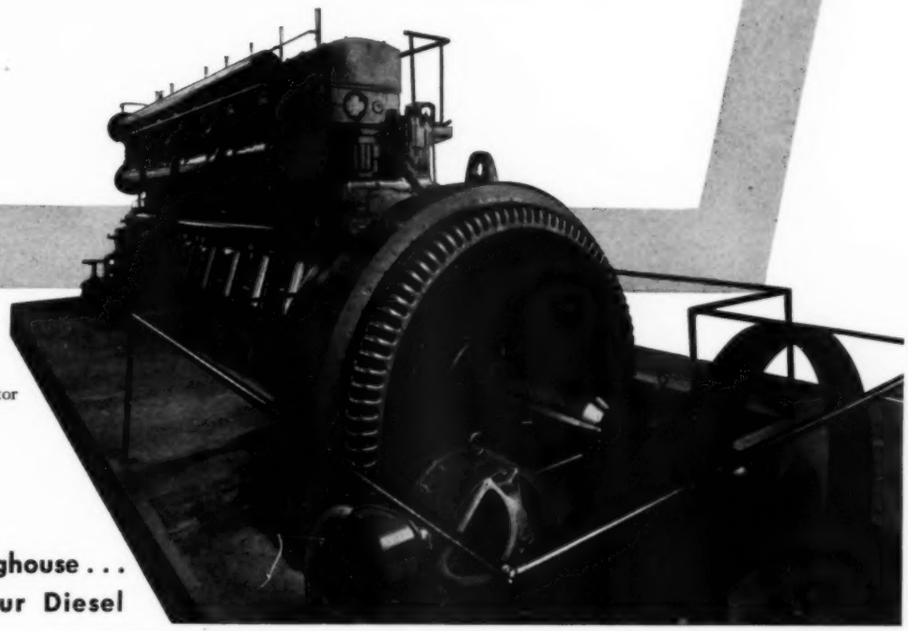
The results are extra dependability, stamina, efficiency that, time and again, give skippers *better* work . . . at lower cost. We can't "prove" that with talk, and we don't need to. The proof of the pudding's on the job. And plenty of skippers are joined with Skipper Santos in passing the good word — *Mack!* — along.

MACK MANUFACTURING CORPORATION
Marine Engine Division, Empire State Building, New York, N. Y.

Mack DIESEL MARINE POWER

MACK MARINE ENGINES ARE A PRODUCT OF THE BUILDERS OF WORLD-FAMED GASOLINE AND DIESEL-POWERED TRUCKS, BUSES AND FIRE APPARATUS

How your Diesel-driven generator can deliver maximum performance



Worthington
Diesel Engine
driving 875 KV-A
Westinghouse Generator

Specify Westinghouse . . . it matches your Diesel

In 1886—56 years ago—Westinghouse introduced the first A-C generator ever used in this country, to convert mechanical power into electrical power. Since then, thousands have been constructed by Westinghouse—*are in daily use.*

And since the coming of the Diesel engine, additional thousands have been built—each one, like its forebears, *exactly matched* to the electrical traits of the engine drive—to give the greatest degree of efficiency of generation.

In the Westinghouse A-C Generator, as it stands beside your Diesel today, there's a wealth of engineering talent, inventive genius and seasoned experience—a generator designed for that particular Diesel engine—a combination that functions like a single unit.

There's no magic connected with the outstanding performance record of the Westinghouse A-C Generator. It's built there. That's why operating efficiency is so high—maintenance costs so low.

If you want your A-C generator to deliver maximum long-life performance—specify Westinghouse.

Write for booklet B-3028 describing this generator in detail. Address Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., Dept. 7-N.

J-10223

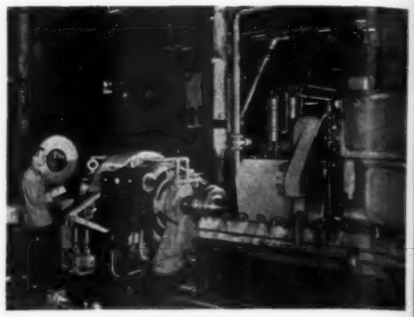
Westinghouse

FOR DIESEL ENGINE DRIVES — A-C GENERATORS

Marine Diesels Get Ten-Day Electrical Tests Before Shipment

HELPING to speed production of supercharged Diesel engines for harbor and seagoing tugs, mine sweepers, net tenders, and for many other marine and industrial uses, is this General Electric inductor dynamometer at the Enterprise Engine and Foundry Company, San Francisco. The dynamometer is shown here putting a 1000-horsepower Diesel engine through a ten-day test under simulated operating conditions.

During the test period, each Diesel engine is loaded to any desired degree simply by turning a rheostat dial on the G-E dynamometer control panel. The dynamometer is capable of absorbing up to 3500 horsepower over a range of 850 to 2500 revolutions per minute. When the Diesel engine is being tested, the operator takes readings from the automatic scale and from a speed-indicating tachometer. These readings serve as the basis for calculations of the horsepower being developed by the engine at different speeds.



G-E water-cooled inductor dynamometer coupled to Enterprise Marine supercharged Diesel engine, 1000 hp, 8-cylinder, type DMQ. Dynamometer, 1100 hp, at 300 rpm to 3500 hp at 850/2500 rpm, type TG-100T, with Kron automatic scale, hand-rotated trunnion bearings, and automatic control system. Control includes CR1423-A1 dead-front enclosed panel for wall mounting. In plant of the Enterprise Engine & Foundry Co., in San Francisco, Calif.

An interesting nonmarine job now under way at the Enterprise Engine and Foundry Company includes a number of 1000-horsepower Diesel engines to be direct-connected to 650-kilowatt General Electric generators for United Nations service abroad.

INSTANT THROTTLE RESPONSE
WITH GUIBERSON LIGHT WEIGHT DIESEL
POWER
FOR TANKS • FOR PLANES • FOR SHIPS
Power when it is needed at a touch of the hand—that's the Guiberson radial air-cooled diesel! The instant response to the throttle of Guiberson engines is the result of the amazingly effective simplified injection system that delivers fire-safe liquid fuel directly into the cylinders under 2,500 lbs. pressure. In planes, in tanks, and in light ships the fast response of the Guiberson can spell the difference between destruction or victory. For low-cost, dependable engine operation without fire hazard or radio interference, it's the Guiberson—America's only radial air-cooled diesel engine!
AMERICA'S RADIAL AIR-COOLED DIESEL ENGINE
ESTABLISHED 1919
Guiberson U.S.A.
GUIBERSON DIESEL ENGINE COMPANY
Dallas, Texas
THE GUIBERSON CORPORATION
Aircraft and Heater Division

Young Radiator Company Appoints A. R. Johnson California Representative

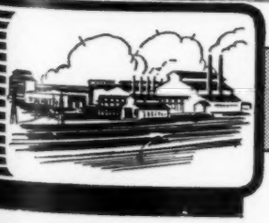
YOUNG RADIATOR COMPANY, manufacturers of heat transfer products for building, aircraft, automotive, marine, industrial, transportation and related fields, announces the appointment of A. R. Johnson, who will maintain offices in Long Beach and Los Angeles, California, as Sales & Engineering Representative in the California territory south of and including Inyo, Kern and San Louis Obispo counties and Clark county in Nevada.

Mr. Johnson will provide a complete sales and engineering service on the line of heating, cooling and air conditioning products including unit heaters and convectors made by Young Radiator Company for factories, public buildings, apartments, homes and general space conditioning.

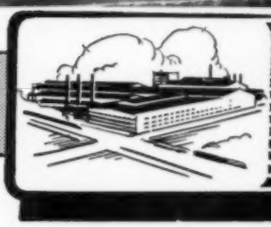
Prior to his affiliation with Young Radiator Company, Mr. Johnson was associated with the Guy F. Atkinson Co.-Geo. Pollock Co., contractors to the Navy, Long Beach, California.

One RESPONSIBILITY··· *One* CONTROL

FROM raw materials to finished product . . . your specifications are carefully and accurately worked to completion . . . ***one definite control*** and ***one responsibility*** . . . these advantages are yours when you place your requirements for special forgings and steel castings with the Erie Forge Company.



ERIE FORGE COMPANY, ERIE, PA.



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Sperry Gyroscope Company Names Chief Research Director

CARL A. FRISCHE has been named Chief Research Director of The Sperry Gyroscope Co., Inc., according to information made public recently by R. E. Gillmor, company president. Mr. Frische succeeds Hugh Willis, who is now General Sales Manager of the company.

In his new post, Mr. Frische assumes charge of the company's Garden City, L. I., laboratory which employs more than 1500 technicians for the design, development, and test of military, marine, and aircraft precision instruments.

For the last year he has had complete charge of research engineering—working full time on developments for the armed services. Since joining the Sperry organization in 1933, he has made many contributions to the development of aviation; notable among these were the development of automatic pilots, bombsights, and the sound-proofing of airplanes.

Mr. Frische received an A.B. degree from Miami University (Ohio) in 1928; an M.S. in 1931, and a Ph.D. degree one year later from State University of Iowa (Iowa City). He held a Research Fellowship at Columbia University for a year previous to joining the Sperry Company; and is a member of the American Institute of Physics and Institute of Aeronautical Sciences.

Carl A. Frische, recently appointed Chief Research Director of The Sperry Gyroscope Co

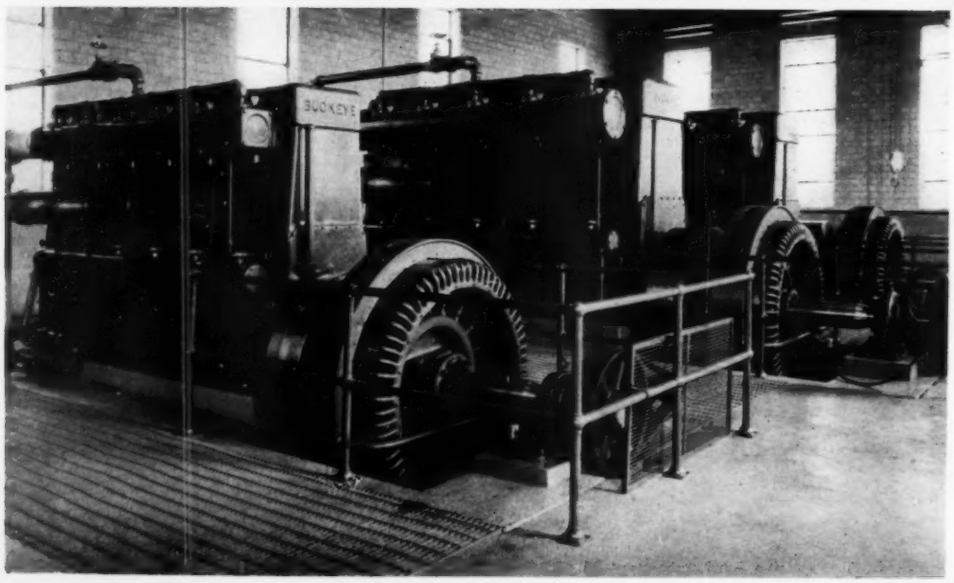
Hyatt Bearings Division Issues a New and Useful Engineering Handbook

THE New Hyatt Engineering Handbook is a scrap book collection of fundamental engineering data such as an engineer or designer might himself assemble from various sources to obviate the necessity of poring through numerous reference books. In addition, it contains much entirely new material to eliminate time-consuming calculations. The company has spared no effort to make this an outstanding handbook. Request for a copy of the book should be written on a company letterhead, giving the position of the one making the request to Hyatt Bearings Division, General Motors Corporation, Harrison, N. J.

Kerkling & Company Inc. Announce New Pacific Coast Office

KERKLING & CO., INC., Bloomington, Indiana manufacturers of K&W Metallic Seal and Licensor of the K&W Mechanical Method of repairing cracked engine blocks and heads, recently announced the opening of its new Pacific Coast Office at 6516 Selma Avenue, Hollywood, California.

Cutting the Cost of Living



Three Buckeye Diesels, totalling 975 hp., installed in the Grayling, Michigan municipal power plant in the Spring of 1940.

BUCKEYE DIESELS, have, in the past three years, brought this community drastic reductions in consumer rates and city tax rate plus a net operating profit amounting to better than 30% of gross income. These Buckeye units have given more than 40,000 engine hours of unfailing service and have only begun their long life of money-saving, money-making usefulness.

Engine Builders Since 1908

Be Profitwise and Dieselize with Buckeyes

THE BUCKEYE MACHINE COMPANY ..... LIMA, OHIO

THE EXECUTIVE WHO STOPS TO THINK . . .

Knows that "10% for War Bonds isn't enough these days"

Workers' Living Costs going up . . . and Income and Victory Tax now deducted at source for thousands of workers . . .

Check! You're perfectly right . . . but all these burdens are more than balanced by *much higher* FAMILY INCOMES *for most of your workers!*

Millions of new workers have entered the picture. Millions of women who never worked before. Millions of others who never began to earn what they are getting today!

A 10% Pay-Roll Allotment for War Bonds from the wages of the family bread-winner is one thing—*a 10% Pay-Roll Allotment from each of several workers in the same family is quite another matter!* Why, in many such cases, it could well be jacked up to 30%—50% or even more of the family's *new* money!

That's why the Treasury Department now urges you to revise your War Bond *thinking*—and your War Bond *selling*—on the basis of *family* incomes. The current War Bond campaign is built around the family unit—and labor-management sales programs should be revised accordingly.

For details get in touch with your local War Savings Staff which will supply you with all necessary material for the proper presentation of the new plan.

Last year's bonds got us started—*this year's bonds are to win!* So let's all raise our sights, and get going. If we all pull together, we'll put it over with a bang!

This space is a contribution to America's all-out war effort by

you've done your bit
. . . now do your best!

★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★

R. T. Kennedy

Editor—DIESEL PROGRESS

Caterpillar Announces Important Personnel Changes

D. A. ROBISON has resigned as Vice President of Caterpillar Tractor Co., Peoria, Illinois, to become the company's distributor at Salt Lake City, Utah and Gail E. Spain, who was made a Vice President in May, 1942, will succeed him as administrative Vice President of the Advertising, Sales, Export, Engine Sales, Special Products and War Contracts Departments, according to an announcement by L. B. Neumiller, President of "Caterpillar".

Mr. Robison is realizing a long-held ambition to become a "Caterpillar" distributor, the opportunity to achieve that goal arising when H. D. Landes decided to retire from the Salt Lake City distributorship. Mr. Landes, who has represented "Caterpillar" in the Utah and southern Idaho territory for 20 years, is giving up most of his business interests but will continue to devote considerable of his time and attention to recently acquired cattle interests. The formal transfer of the distributorship will occur some months hence.

Because of his many years in the "Caterpillar" organization, and the breath of his experience, Mr. Robison is exceptionally well qualified to assure a continuance of the fine service the Landes organization has extended to its customers for two decades.

Mr. D. A. Robison

Mr. Robison, a native of Nevada, was graduated from the University of Nevada with a business degree and almost immediately became associated with "Caterpillar," starting in the shipping room of the Parts Department at San Leandro, California in 1926. He advanced rapidly through various positions in the Credit and Treasury Department to the office of Assistant Treasurer, Treasurer and then General Sales Manager. He was promoted to Vice President in 1940.

Mr. Gail E. Spain

KEEPING *Diesels* AT PEAK PERFORMANCE

SUBMARINE tenders have the vital task of keeping our submarines ever on the offensive against enemy craft. They are "Mother" ships, completely equipped to care for every need of our underseas fleet and its personnel. The PREMAX Engine Indicator is used on the engines in Diesel-powered Sub Tenders to check compression and firing pressures—the proper maintenance of which assures uninterrupted power, maximum fuel economy, and peak engine performance.

The PREMAX Indicator is direct-reading—it instantly indicates true cylinder pressure conditions at any engine speed. Requires no skill, scaling of diagrams, or calculations. The PREMAX is rugged, durable, lastingly accurate—has proved its universal applicability first, by long and widespread use on stationary and automotive Diesels operated in the power and transportation industries, and now on the Diesels in scores of combat and auxiliary units of the United States Fleet.

INVEST TODAY IN BONDS FOR VICTORY

BACHARACH INDUSTRIAL INSTRUMENT CO.
7000 BENNETT STREET · PITTSBURGH, PA.

Mr. Spain, who has been in charge of operations at San Leandro since his elevation to Vice President, is returning to Peoria to assume his new responsibilities.

A native of Portland, Oregon, Mr. Spain was graduated from Oregon State College in 1920 with the degree of Mechanical Engineer. After his graduation he joined the Willamette Iron & Steel Works at Portland and spent nine years in the Sales and Engineering Departments and as Sales Manager.

He joined "Caterpillar" in 1929 as Logging Representative. Succeeding administrative positions in the Merchandise, Engine and Engine Sales Departments and in the Sales Development Division culminated in his appointment as General Sales Manager in 1940, followed by a Vice Presidency last year.

Cooper-Bessemer Makes Carl H. Vaupel Assistant General Manager

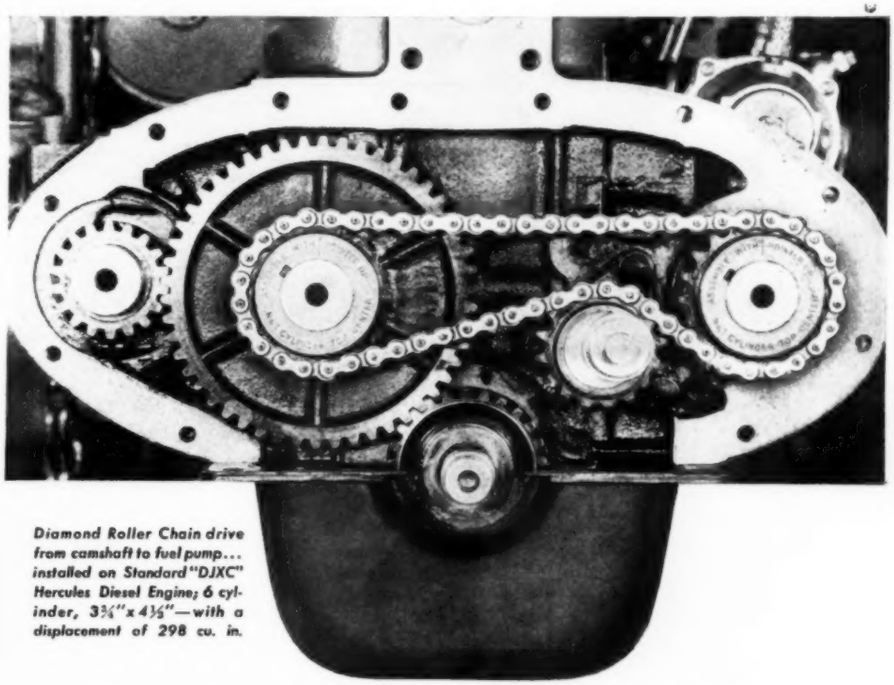
THE Cooper-Bessemer Corporation has just announced the appointment of Carl H. Vaupel to the position of assistant general manager, applicable to the company's two plants, one at their Mount Vernon, Ohio headquarters and the other at Grove City, Pa.

Mr. Carl H. Vaupel

It is pointed out that Mr. Vaupel's background makes him admirably suited for his new executive position. This is due partly to his working very closely with B. B. Williams, Chairman of the Board, and Gordon Lefebvre, who recently succeeded Mr. Williams as President, and due also to the wealth of experience he gained in the heavy machinery industry before joining Cooper-Bessemer in January of 1941.

Graduating from the University of Illinois in 1924, Mr. Vaupel immediately became associated with the Diesel Engine Division of Fairbanks, Morse & Company, Beloit, Wisconsin, where he worked until 1937 in various capacities in their experimental, research and engineering departments.

Since then and until joining Cooper-Bessemer he was connected with the Northern Pump Company as Eastern sales representative, and the Aircraft & Diesel Equipment Corporation as sales manager. Since joining Cooper-Bessemer early in 1941, Mr. Vaupel has been devoting the major portion of his time to various managerial duties at the company's Grove City, Pa. plant where production is concentrated mainly on large Diesel engines for the Navy, Coast Guard, and Maritime Commission.



Diamond Roller Chain drive from camshaft to fuel pump... installed on Standard "DJXC" Hercules Diesel Engine; 6 cylinder, 3¾" x 4½"—with a displacement of 298 cu. in.

Fuel Supply INSURED

● Among the scores of Diesel engines in wide usage, the Hercules model "DJXC" engines are numbered among the many well-known makes equipped with Diamond Roller Chains.

The reliable performance of Diamond Chains for important pump, accessory, and timing drives has been proven over and over again on engines totalling more than a million horsepower. They provide long-time accuracy, combine great strength and quietness of operation, with minimum weight, width and bulk.

For your projected new models, experienced Diamond engineers can help save time by assisting in planning appropriate drives . . . DIAMOND CHAIN & MFG. CO., 407 Kentucky Avenue, Indianapolis, Indiana. Offices and Distributors in All Principal Cities.

DIAMOND ROLLER CHAINS

Volume Eight of the DIESEL ENGINE CATALOG is now available. Completely revised, this book contains the description and detailed specifications of One Hundred and Sixty-two engines. Nothing like it published. The most useful Diesel book available, containing a complete cross section of this rapidly expanding industry, insofar as the engines and accessories available are concerned. An indispensable book for all interested in Diesel engines.

ORDER YOUR COPY OF VOLUME EIGHT • NOW!

162 engines described and illustrated

$5.00

NOW READY
TO MAIL
NEW - BIGGER - BETTER

DIESEL ENGINES DESCRIBED

Alco Four Cycle Stationary
Alco Universal Type
Alco-Sulzer "T" and "TM"
Atlas Imperial
Atlas-Lanova
Buckeye Diesels
Buda-Lanova Diesels
Busch-Sulzer Bros. 2-cycle
Busch-Sulzer Bros. 4-cycle
Caterpillar Industrial Engines
Caterpillar Marine Engines
Chicago Pneumatic Model 8-CP, and 9-CP
Chicago Pneumatic Type 16-CP
Chicago Pneumatic Type RHB-50
Clark Bros. Diesels
Consolidated Diesel Electric Power Units
Cooper-Bessemer Type JS
Cooper-Bessemer Type EN & GN
Cooper-Bessemer Type LS Marine
Cummins Diesels
De La Vergne Series 10
De La Vergne Model VG
De La Vergne Model VM
De La Vergne Gas Engines
De La Vergne Model VO
Dodge-Lanova Diesels
Enterprise Diesels
Fairbanks-Morse 33 and 37
Fairbanks-Morse 36
Fairbanks-Morse 42
Fairbanks-Morse 32 and 35
Fairbanks-Morse Model 38
Fairbanks-Morse Model 46
Fulton Diesels
General Motors Model 71
General Motors Model 567
Gray Marine Diesels
Guiberson Radial Diesels
Hamilton Engines
Hercules Diesels
Hill Diesels
Ingersoll Rand Type "S"
International Harvester
Kahlenberg Engines
Kermath 4-cycle
Lathrop Types D50 and D80
Lister-Blackstone Diesels
Lorimer Diesels
Mack-Lanova Diesels
Murphy Diesels
Nordberg 4-cycle Diesels
Nordberg 2-cycle Diesels
Nordberg Gas-Diesels
Palmer Bros. Diesels
Rathbun-Jones Diesels
Rathbun-Jones Gas Engines
John Reiner Marine Units
Sheppard Diesels
Superior Model "A"
Superior Model "D"
Superior Type M
Superior Type S
Union Diesels
U. S. Diesel Plants
Venn-Severin Models HC and M
Washington Iron Works Diesels
Waukesha-Hesselman Type
Witte Types
Wolverine Diesels
Worthington Diesels
Worthington Gas Engines

DIESEL

DIESEL ENGINES, INC.—Two West Forty-Fifth Street—New York 19, N.Y.

Enter my order for a copy of the New Diesel Engine Catalog, Volume Eight, Edited by Rex W. Wadman, for which I enclose $5.00.

NAME _____

ADDRESS _____

Please print name and address. Sorry, we cannot imprint names on this year's edition of the Diesel Engine Catalog

Exide Announces New Plastic Battery Retainer

ANNOUNCEMENT of a plastic storage battery retainer manufactured from polystyrene, for use in certain types of Exide batteries, is made by The Electric Storage Battery Company, Philadelphia.

Retainers play an important part in the performance and life of the storage battery. They are a part of the separation or insulation between the positive and negative plates, and act principally to retain the active material in the positive plates.

The new retainer not only has technical advantages, but is also said to be more permanent than the former type of retainer, according to the Company. In addition, as it is now manufactured, it uses less critical material. "Development work on the new retainer was started in the Exide laboratories before the outbreak of the war," states L. E. Lighton, Manager Development and Design Department. "The object of this experimental work was to find a material superior to existing retainers from both the performance and manufacturing costs angle. Extensive field tests were undertaken and Exide was virtually ready to put the new plastic retainer on the market when the war effort of our Allies began to demand the raw material from which it was to have been made.

"This presented a double problem, as the shortage of rubber later made it even more urgent that some way be found to produce the new plastic retainer without drawing upon the supply of another critical material. Work on this newest phase of the development was begun in spite of what seemed a hopeless task with so many plastics being rapidly put on the critical list. However, our research laboratories again went to work on the problem, and the result is the new slotted polystyrene retainer which Exide is now putting on the market.

"Although the basic raw materials are still on the critical list, the new polystyrene retainer can be manufactured from secondary materials, by-products from the use of this material for other war purposes. The result is a retainer that marks a distinct step forward in battery design just as the slotted rubber type, which was developed years ago did in its day."

A 12 ounce Sentry

It's the VISCO-METER* we're talking about... 12 ounces of mechanical precision doing wide-awake sentry duty on gasoline and Deisel engines in the services and on the home front.

In an engine—be it marine, motor transport or supplying power for landing field lights—efficiency and service life are measured in terms of constant, correct lubrication. Anything less than making sure is an invitation to trouble.

And VISCO-METER* is the one dependable means of *making sure.* Via its gauge, the VISCO-METER* is visual entry to the crankcase, continuously telling the operator the lubricating value (viscosity) of the oil while the engine is in operation.

Uncle Sam is thorough. Long before the war, VISCO-METER* was in service on government truck engines... and proving its worth by warning of impending lubrication failure as well as effecting economies in oil consumption. That's why VISCO-METER* production has been "upped" to a new high and every unit enlisted for sentry duty.

It won't be long before VISCO-METER* production will be available for peacetime use on all types of internal combustion engines... inexpensive and necessary to make an engine complete. Service records are more convincing than words. A VISCO-METER* engineer will help you get ready for tomorrow.

VISCO-METER
CORPORATION **GROTE ST., BUFFALO, N. Y.**

**Fully covered by U. S. and Foreign Patents*

New Diesel Starting Tank Bulletin

"SCAIFE Starting Tanks for Diesel Engines" is the title of a new colorful 8-page bulletin published by the Scaife Company.

Although the new bulletin describes marine applications primarily, the information it contains applies to both marine and land operating Diesel engine starting tanks. It contains valuable up-to-date information on capacities, dimensions and weights of both vertical and horizontal tank installations. A standardized Marine Designers Specifications Form is included, prepared to assist Diesel engine designers in proper choice of air starting tanks.

The marine starting tanks described can be built to any required code, including the American Society of Mechanical Engineer's Code for Unfired Pressure Vessels; the Marine Regulations and Material Specifications (B.M.I.N.); the American Bureau of Shipping Regulations; Lloyd's; Bureau Veritas.

Copies of the new Scaife Starting Tank Bulletin, a valuable reference for Diesel engine designers, marine architects and engineers, are available by writing this publication or direct to Scaife Company, Oakmont, Pa. Ask for Bulletin No. 313.

Wilkening Makes New Appointments

ANNOUNCEMENT is made by the Wilkening Manufacturing Co. of Philadelphia and Scranton, Pa., maker of Pedrick piston rings, of the appointment of Walter A. Kirkpatrick to the post of Public Relations Manager. Mr. Kirkpatrick has been with the Wilkening organization for more than 10 years, most recently as Manager of Advertising and Sales Promotion.

Mr. Walter A. Kirkpatrick

In his new capacity he will continue to supervise the company's advertising and sales promotion activities and in addition will be responsible for all other phases of public and employee relations, morale, production stimulation, welfare, safety, charity drives, war bond promotion and similar activities.

Maxham Metcalf, who has been a member of the Wilkening advertising department for the past year and a half, has been advanced to the position of assistant Sales Promotion Manager.

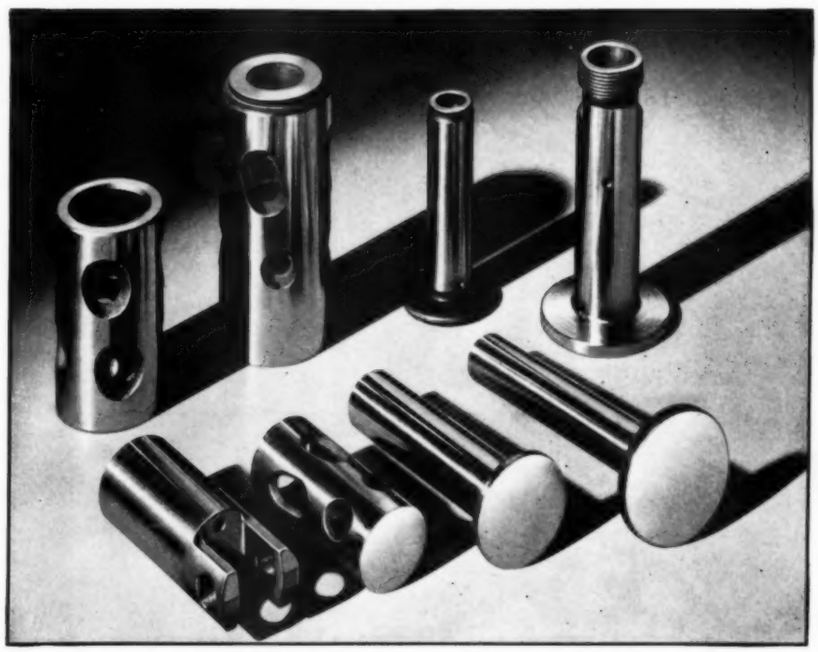
C. S. Durges, formerly with the New York Shipbuilding Co. and the Penn-Jersey Shipbuilding Co. has joined the Wilkening organization as Safety Engineer, in direct charge of personnel and facilities having to do with the safety and protection of workers, property and materials of the company.

Sperry Products, Inc., Appoints Richard D. LaFond Director of Public Relations

J. B. FARWELL, President of Sperry Products, Inc., Hoboken, New Jersey, recently announced the appointment of Richard D. La Fond as Director of Public Relations.

Mr. La Fond will direct all advertising, publicity, and employee-morale activities for Sperry, in addition to inaugurating an enlarged program of customer-relations designed to make available the benefits of Sperry research and field application data to the railroad, marine, and aviation industries.

Before coming with Sperry, Mr. La Fond was Sales Promotion Manager for Dresser Manufacturing Company, of Bradford, Pa., and, before that, he was connected with the Industrial Advertising Section of the General Electric Company, in Schenectady, New York.



"CHICAGO"

VALVE TAPPETS FOR DIESEL ENGINES

Steel Mushroom and Cast Iron Ported Type

Present day conditions demand "front line" efficiency of your Diesel!

An untold number of Diesels are giving consistent and effective service—day and night—all over the world—meeting the toughest **service demands** with **Chicago Tappets.**

We are specialists in the manufacture of Valve Tappets, Connecting Rod Bolts, Valve Spring Retainers—all to **Aircraft Quality Standards.**

THE CHICAGO SCREW CO.

ESTABLISHED 1872

1026 SO. HOMAN AVENUE CHICAGO, ILL.

Cleveland Chamber of Commerce Selects Best Factory Buildings

THE Cleveland Graphite Bronze Company plant at 16800 St. Clair Avenue, has been chosen as the best large factory building constructed in Greater Cleveland during 1941-1942 by the Cleveland Chamber of Commerce, Walter I. Beam, executive vice president, announced.

Mr Beam also announced that the Bunnell Machine & Tool Company plant at 1601 East 23rd Street, had been chosen as the best small industrial plant, and that honorable mention had gone to the *Cleveland Diesel Engine Division of General Motors Corporation*, 7700 Clinton Road; Cleveland Hobbing Machine Company, 1311 Chardon Road, Thompson Aircraft Products Company, Euclid, Ohio, and Weber Gauge Company, 12900 Triskett Road.

The Cleveland Graphite Bronze Company plant was designed by John H. Graham, architect, with John Paul Jones, Carey & Millar, mechanical engineers, and was built by Albert M. Higley Company. The Bunell plant was designed by W. H. Hatch, architect, and was built by the J. L. Hunting Company.

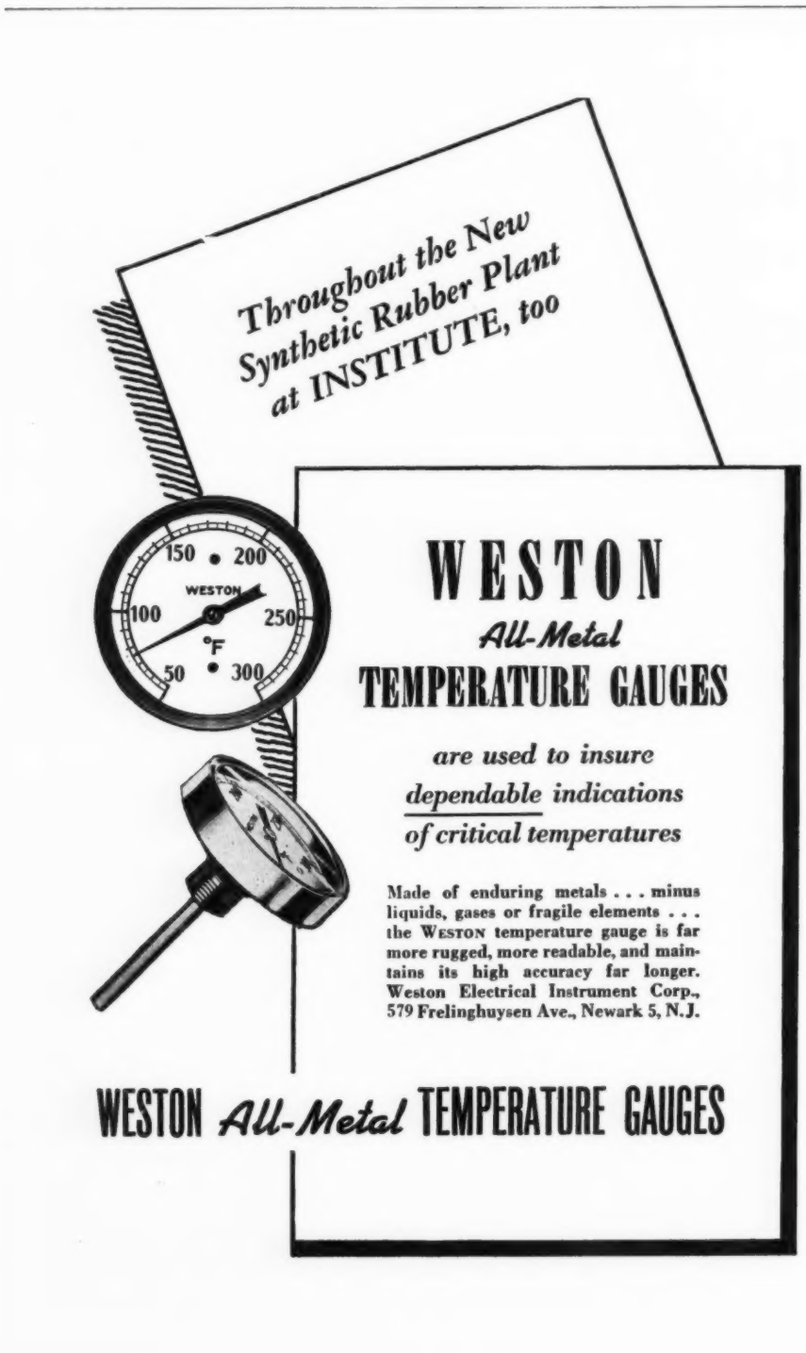
Honorable Mention 1942: Cleveland Diesel Engine Division of General Motors Corporation, 7700 Clinton Road, Cleveland, Ohio. Designed and built by The Austin Company.

The awards, recommended by a special committee on Medal awards for excellence in industrial plant construction, of the Chamber's Construction Industries Committee, after viewing 101 industrial plants throughout Greater Cleveland, were approved by the Chamber Board of Directors.

Factors considered in judging the buildings were: Aesthetic Values — Simplicity of design, Proportion, Artistic use of appropriate materials, and, Adaptability. Structural values—Quality of materials, structural use of materials, and, Quality of Workmanship. Economic values —Adaptation of space to use, Provisions for Cleaning, Servicing facilities, and, Modern conveniences. Health and safety factor—Fire, Sanitation, Light, Ventilation, Ratio of unused land, and, Recreational Facilities.

Conditions governing the eligibility of the buildings were as follows:

The classification of a building is determined from the official building records of the municipality in which the building is located, as defined in the building code of that municipality. Awards were made to those buildings which were in the process of construction and were completed during the calendar years of 1941 and 1942.


Throughout the New Synthetic Rubber Plant at INSTITUTE, too
WESTON
All-Metal
TEMPERATURE GAUGES
are used to insure dependable indications of critical temperatures
Made of enduring metals . . . minus liquids, gases or fragile elements . . . the WESTON temperature gauge is far more rugged, more readable, and maintains its high accuracy far longer. Weston Electrical Instrument Corp., 579 Frelinghuysen Ave., Newark 5, N.J.
WESTON All-Metal TEMPERATURE GAUGES
150 200 100 250 50 300 °F WESTON

New Positive Method of Preparing All Metal Surfaces for Metallizing

METALLIZING Company of America, 1330 W. Congress Street, Chicago, Illinois has just published bulletin describing the new Mogul

Electric **Bonder, a time and money saving unit** for preparing hardened metal surfaces for metallizing. Operates on 220 volts, 60 cycle line. Patented air-cooled electrode holder permits high speed bonding without fear of overheating, pre-hardening or distortion. Eliminates guesswork in preparation, eliminates carbon ring characteristic of other methods, eliminates the necessity of a lathe. Was developed originally to prepare heat treated surfaces for metallizing—works equally well on all metals. Practically as fast as rough threading. Folder gives specification, price and other money saving information. Write Metallizing Company of America, 1330 W. Congress Street, Chicago, Illinois for your copy.

New Steam-Jacketed Strainer by Blackmer

A NEW strainer for handling highly viscous liquids or liquids that are solid at room temperatures has recently been announced by the Blackmer Pump Company, Grand Rapids, Michigan. Steam-jacketed strainers are used to maintain the liquid in the strainer at the same temperature as in the piping and were developed primarily to speed the handling of difficult liquids in war production plants. This new strainer has wide application in many of the process industries and has become a permanent number in the Blackmer "Ezy-Kleen" line of strainers.

Standard capacities are 20, 50, 100 and 200 GPM. Pipe sizes 1, 2 and 3 inches. The 1″ and 2″ (50 GPM) units have threaded pipe connections. The 2″ (100 GPM) and 3″ units have flanged connections. Maximum operating pressure is 50 psi at temperature of 600° F. The jacket is suitable for 125 lbs. steam pressure. The bottom and sides of the unit are completely enclosed in a steam jacket. Two inlet and two outlet ports are provided for steam line connection.

According to J. B. Trotman, General Sales Manager of the Blackmer Company, these new strainer units are available for reasonably prompt delivery upon proper priority.

Caterpillar Vice President Takes U. S. Navy Civilian Orientation Course

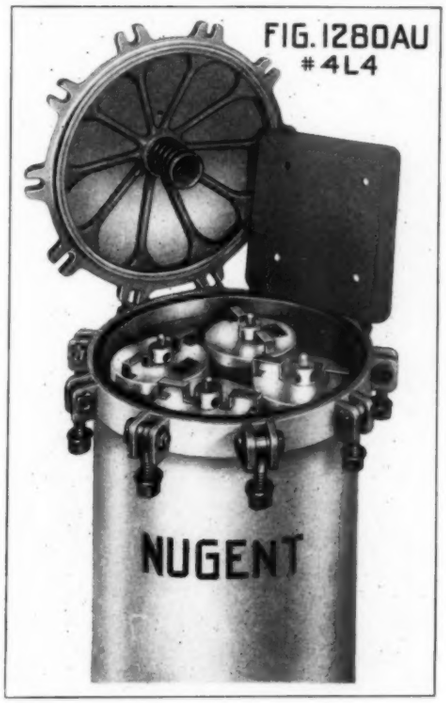
GAIL E. SPAIN, Vice President of Caterpillar Tractor Co., has just completed a U. S. Navy Civilian Orientation Course which included inspection of warships, shipyards, Navy fighters and bombers and a submarine cruise—with two 80-foot dives for good measure.

The Navy Department sponsors the Orientation Course on Naval equipment, organization, logistics, strategy and tactics to a limited number of business leaders whose companies are actively engaged in producing Navy materiel.

Purpose of the course is to acquaint business men with the purpose, composition and problems of the U. S. Navy in order that the work of the Navy and its contractors may be better coordinated.

Field trips included the Navy Yard in Brooklyn where the class was permitted to go aboard battleships, cruisers, destroyers and PT boats; an inspection of Marine barracks; inspection of new battleships and carriers abuilding; a visit to Floyd Bennett Field to inspect Navy fighters and bombers; and a trip to New London.

James Forrestal, the Under Secretary of the Navy, was guest of honor at the farewell luncheon for the class.



GET THE *MOST*
from Diesel Engines
. . . use NUGENT Filters

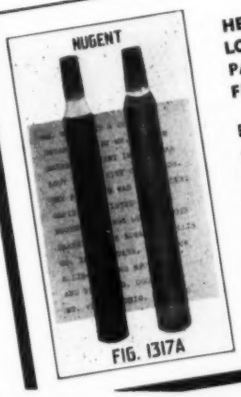
Clean oil can add hours to the life of Diesel engines, reduce maintenance costs and increase engine efficiency. The use of Nugent Filters is a proved method of providing *dirt-free* oil for Diesel engines.

Nugent Absorbent Type Fuel and Lubricating Oil Filters are used in stationary engine plants, cement mills, rubber mills, steel mills, etc. These filters are available in sizes for Diesel engines from 1 to several thousand H.P. in single containers.

The improved Nugent Depth Type Pressure Filter shown is equipped with four filter cartridges in a single container. All cartridges are alike and interchangeable regardless of whether they are the Re-packable type or the Re-placeable (throw away) type. Both types are made for capacities from 1 up to 2248 H.P. in single containers or shells. (Navy Specifications.)

WM. W. NUGENT & CO., Inc.
Established 1897
415 N. Hermitage Ave., Chicago, Ill.

The new Nugent Re-placeable "Throw Away" Absorbent Filter Recharge may be used in the cartridges for the Nugent Depth Type Pressure Filter shown above. This new recharge is inserted into the filter cage instead of hand packing loose waste. It absorbs four times its own weight of water, dirt and other impurities, yet it does not remove additives embodied in the oils.



HERE'S THE WAY LUBE OIL LOOKS BEFORE and AFTER PASSING THROUGH A NUGENT FILTER

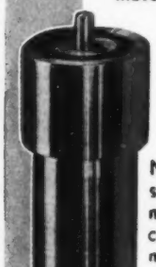
BEFORE: Shown at the left is a sample of dirty crankcase oil taken from a 300 H.P. gas engine before installing a Nugent Filter.

AFTER: At the right is a sample of oil from the same engine after installing a Nugent Filter, and operating 1,344 hours before cleaning filter.

NUGENT FILTERS

PRECISION BUILT
DEMCO
FUEL INJECTION EQUIPMENT

Demco design, manufacture and test are based on the ultra-precise requirements of effective Diesel fuel injection. Demco fuel injection units are characterized by compactness and clean, simple design, highest quality materials, superb workmanship.

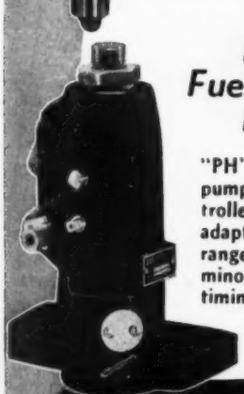


Demco Fuel Nozzle

Nozzles are made in three sizes, with flat seated needles of standard or non-corrosive materials. No. 4 nozzle is self-cooling.

Demco Fuel Injector

Fuel injectors are hydraulically operated, differential, closed type and are made in various lengths with three standard shank diameters.



Demco Fuel Injection Pumps

"PH" fuel injection pumps are port controlled type; they are adaptable to a wide range of Diesels with minor adjustment of timing.

Send specifications with inquiries

DIESEL ENGINEERING
& MANUFACTURING COMPANY
200-214 N. LAFLIN ST., CHICAGO, ILLINOIS

Star Electric Motor Co. Changes Its Official Personnel

THE appointment of a new executive staff of the Star Electric Motor Company and its affiliate, the Star Equipment Corporation was made today at the Company offices, 200 Bloomfield Avenue, Bloomfield. The realignment was brought about both by the death of Carl M. Peterson, co-founder, who served as Secretary and Treasurer of both organizations and as a result of the Companies' expansion. Since the organization of the motor company in 1910, he and Emil E. Hollander, President, had been the only officers.

Fred Eberhard, Vice President and General Manager of Star Equipment Corporation.

Under the new setup agreed upon today, Elvin E. Hollander was made first Vice President of both concerns, Ivor C. Peterson, Vice President in charge of sales and R. J. Gash, Secretary and Treasurer. Raymond E. Hollander becomes Vice President in charge of planning and purchasing for the motor company, while Fred Eberhard becomes Vice President and General Manager of the Equipment Corporation.

Elvin E. Hollander in addition to his title as first Vice President is General Manager of the motor company now engaged 100 per cent in fulfilling war contracts.

Five Lines of Products Represented in New Weatherhead Catalogs Supplement

THE diversified products of The Weatherhead Company, Cleveland, are shown together in one publication for the first time in the new Weatherhead Catalogs Supplement, which is now available for distribution. This supplement is published for the convenience of engineering, production, designing and purchasing departments. The Cleveland firm is the world's

SPECIFY HILCO
FOR LUBRICATING OIL PURIFYING

A complete line of lube oil purifiers using Fullers Earth – cotton waste and specially prepared filtering agents.

HILCO OIL RECLAIMERS

A simple, economical and foolproof method of restoring contaminated oil to the full value of new oil. – for direct connecting to one or more Diesel engines for continuous or intermittent operation.

HILCO HYFLOW OIL FILTERS ••

A superior oil filter for perfect filtering of Diesel engine lube oil – for direct-connecting to one or more engines – continuous or intermittent operation.

HILCO AIRLINE OIL PURIFIERS

A perfect method for contact oil purifying for complete oil reconditioning. For batch purifying directly from engine lube oil system or transfer tanks.

The Hilco line offers you a complete lubricating oil purifier service. Write today for free literature and see what Hilco operators are doing—then let us help you select a Hilco to take care of "That Particular Job."

OIL PURIFIER HEADQUARTERS

THE HILLIARD Corporation
122 W. 4th ST., ELMIRA, N. Y.

largest manufacturer of tube and pipe fittings and flexible hose assemblies. In the past it has kept its literature of each line of its products separate.

The supplement, eight pages in all, is a cross section of five lines of products. Each Weatherhead division is represented by a condensation of its regular catalog. Weatherhead's Aviation Division has a showing of aviation tube, pipe, universal and hose fittings. Sixty-nine representative automotive and industrial tube and pipe fittings and other products are illustrated in the section devoted to them. The valves, fittings, and accessories manufactured for the refrigeration industry are described in the refrigeration section. A page is devoted to Weatherhead's exclusive Ermeto fittings, and ample space is given to Marine products.

On the last page the four Weatherhead plants are pictured, along with the regular catalogs which are available on request. Illustrations in the supplement are halftone engravings. The eight pages are printed in two colors, orange and black, and 10,000 are being distributed. The supplement will also be included in Sweet's Product Design Catalog File. Write for your copy of the new Catalogs Supplement to The Weatherhead Company, 300 East 131st Street, Cleveland, Ohio.

Haering Publishes New Edition of "Organic Methods"

A NEW fifth edition of the D. W. Haering and Company Booklet on "Organic Methods of Scale and Corrosion Control," America's only text on the use of organic chemicals in water treating is just off the press. This new twenty-eight page discussion of organic methods presents the newest information on scale and corrosion control.

The Haering Organization has incorporated a number of charts, graphs, tables and half tones to illustrate the usefulness of organic chemicals in water conditioning and point the way to substituting these efficient and available chemicals for products which are now obtainable with difficulty, if at all.

In addition to the discussion of organic chemicals the new edition includes an explanation of causes of scale and corrosion and introduces a new section tabulating the physical and chemical properties of the various Glucosates developed by Haering Research.

Several pages are devoted to analytical and control test procedures for determining the Glu-

ADVANCING DIESEL DEVELOPMENT

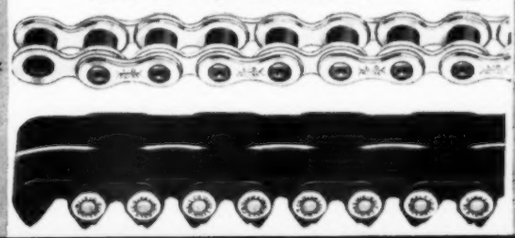
The Diesel engine of tomorrow, reflecting current experience of engineers, builders and users, will assuredly take increased advantage of the flexibility, efficiency, smooth operation and long life of silent and roller chain. Engineers of Link-Belt Company are today working with all interested groups, to give them the full benefit of their years of engine and power transmission experience. Their efforts will go far to realize the possibilities of greater power and greater usefulness of the Diesel engine.

Users as well as builders are invited to make use of this helpful service.

LINK-BELT COMPANY

Chicago Philadelphia New York Atlanta Dallas Indianapolis San Francisco Toronto

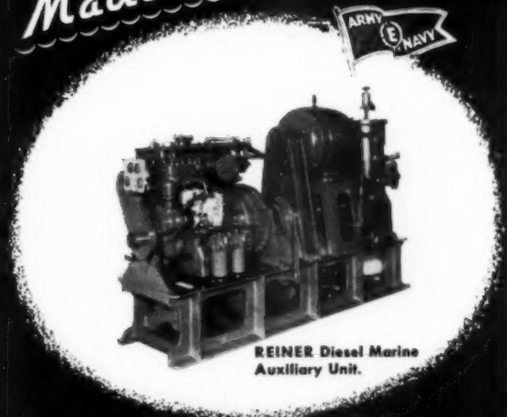
Offices, warehouses, distributors in principal cities. 9132-A



LINK-BELT Diesel CHAIN DRIVES SILENT AND ROLLER TYPES

REINER Made to Order

MARINE AUXILIARY DIESEL POWER UNITS and GENERATING SETS



REINER Diesel Marine Auxiliary Unit.

REINER'S specialty is studying auxiliary service requirements and then assembling selected standard units into one composite unit capable of carrying the entire load.

That such a specialty is more than welcome in marine circles is evidenced by the steady stream of orders for REINER Units received from

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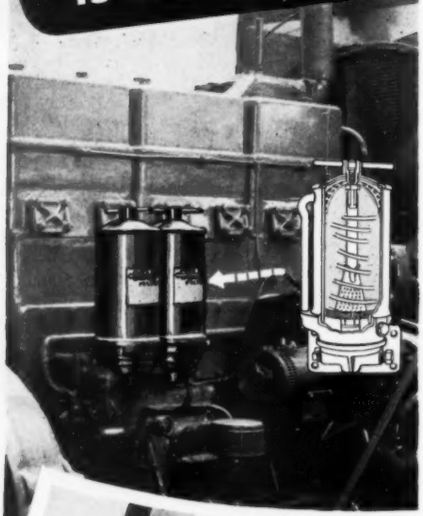
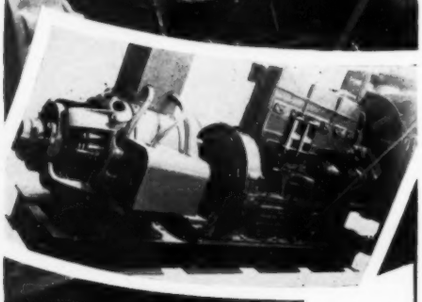
Where Diesels dare not Fail

Oil Cleansing is Essential!





On Diesels operating generators and all types of vital equipment, DeLuxe Oil Filters are preventing one of the causes of excessive engine wear and shutdowns—Oil Contamination. DeLuxe unique oil cleansing action extracts asphaltenes from the oil, before they can "gang up" with other substances to form performance-destroying sludge and engine varnish. DeLuxe, exclusively, has all eight construction features essential to this continuous all-out oil cleansing. With DeLuxe you can use fortified or non-fortified oil, with equal safety! Growing recognition of these and many other DeLuxe advantages accounts for the steadily increasing swing to DeLuxe among diesel operators, industrial, transport and marine. Learn all these advantages for yourself. Write for Free Booklet. DeLuxe Products Corp., 1416 Lake Street, La Porte, Indiana.

DELUXE

OIL FILTER

DOES MORE THAN STRAIN OIL

... MORE THAN FILTER OIL

Actually Cleanses Oil!

cosates and the entire booklet provides a comprehensive discussion of the history, principles, chemistry and control of Organic Methods of Scale and Corrosion Control.

The fifth edition of "Organic Methods of Scale and Corrosion Control" is available without charge or obligation to those addressing requests to D. W. Haering & Co., Inc., 205 West Wacker Drive, Chicago, on business letterheads.

Baldwin Appoints V. H. Peterson

V. H. PETERSON, for the past two years vice president of the Elliott Company, has been appointed Assistant to the President of The Baldwin Locomotive Works, effective June 1, 1943.

V. H. Peterson, Assistant to the President of Baldwin Locomotive Works, Philadelphia, Pa.

Mr. Peterson was educated in the Public Schools of Waterbury, Conn., and started work as a draftsman with the Scovill Manufacturing Company of that city. He attended the Continuation School conducted by the industries of Waterbury, and won a scholarship enabling him to enter Rensselaer Polytechnic Institute from which he graduated in 1925 with a degree in Mechanical Engineering. He entered the employ of the Elliott Company and, in 1938, after serving as sales engineer in the Pittsburgh office and as district manager of the Rochester and Washington, D. C., offices, he returned to the headquarters office at Jeannette, Pa., as assistant to the president in coordinating the sales activities of the company.

In 1941 he was elected a vice-president of the Elliott Company with responsibility for all the sales, advertising and service, which position he left to join the Baldwin Locomotive Works.

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Fourth War Production Award To National Supply

THE National Supply Company was the recipient of its fourth War Production Award with the recent presentation of the Army-Navy "E" to the employees of its Torrance, California, plant. The three previous awards consisted of the Army-Navy "E" at the Ambridge, Pa., and Toledo, Ohio, plants, and the U. S. Maritime Commission Victory Fleet Flag and Maritime M Pennant to the Superior Engine Division at Springfield, Ohio.

Lt. Colonel Lawrence C. Ames presenting the award at the National Supply Company, Torrence, Cal., plant Army-Navy "E" ceremonies.

Presentation of the Award was made to President A. E. Walker by Lt. Col. Lawrence C. Ames, A.A.F. Col. Ames paid tribute to The National Supply Company on its excellent record of achievements in the production of War Materials.

Army-Navy "E" Pins were presented to Reese James of 43 years service, and to Miss Calista Washburn of one year service, representing Plant Employees; and to Miss Georgia Farley of 28 years service, representing Office Employees. Pins were accepted in behalf of all employees by A. J. Hetzel, Chairman, The National Supply Company Unit O.W.I.U., Local No. 128. Chairman Hetzel urged the employees to greater production achievements that the Victory which will bring our boys back home may be hastened.

Rear Admiral Jos. R. Defrees, U.S.N., retired, Inspector of Naval Material, Los Angeles District, gave the principal address and paid tribute to the workers and management for their achievements.

Over 6,000 employees and guests were present at the ceremonies which were broadcast over a nine station Blue Network hookup from Station KECA. The U. S. Coast Guard Band directed by Rudy Vallee was a program highlight.

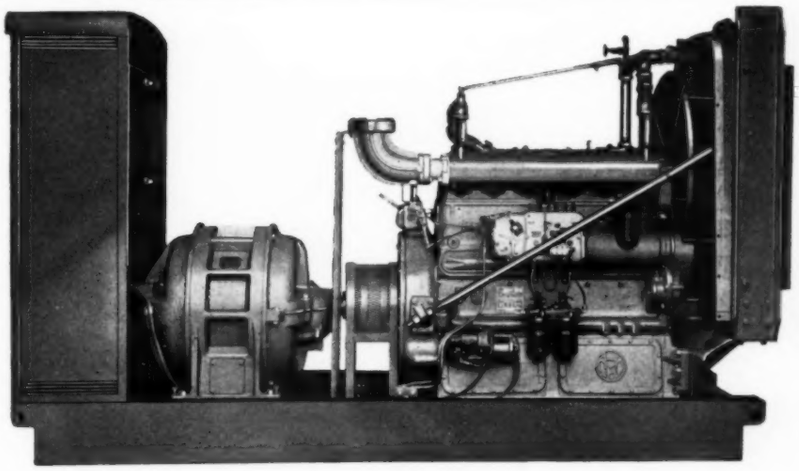
PERFORMANCE OF THIS AIR COMPRESSOR IS

Global-Tested

ABOARD tank-landing craft...deep in the engine rooms of merchant ships...high in the air on army transport planes...on battle-scarred airfields and throughout wartime industry, Quincy Compressors are turning out an efficient and dependable supply of compressed air for our fighting forces....Their new, global-tested performance is indeed a well-earned role to follow the days when almost a hundred leading manufacturers equipped their products with Quincy Compressors for service all over the world...Quincy Compressors provide air for Diesel starting and other services requiring intermittent pressures up to 500 lbs. per sq. in. *If you have compressed air problems, let us help you solve them!*

Quincy COMPRESSORS

QUINCY COMPRESSOR CO. · Department K-7 · QUINCY, ILLINOIS



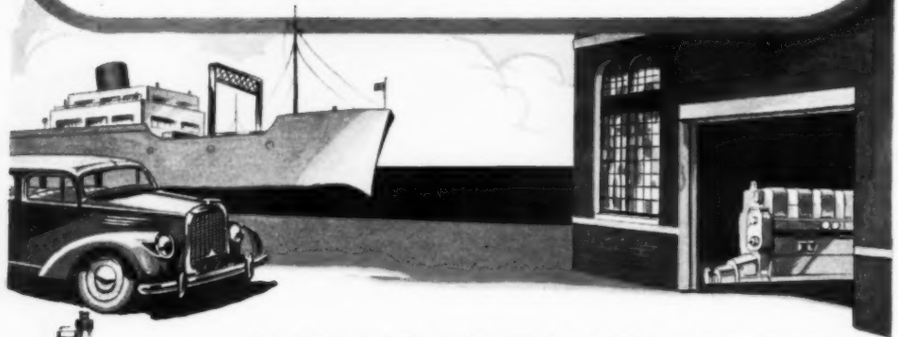
ENGINE GENERATOR SETS

5 KW. TO 100 KW.

Duplex Truck Co.

Lansing, Michigan

IF DIESEL FUEL WERE FREE

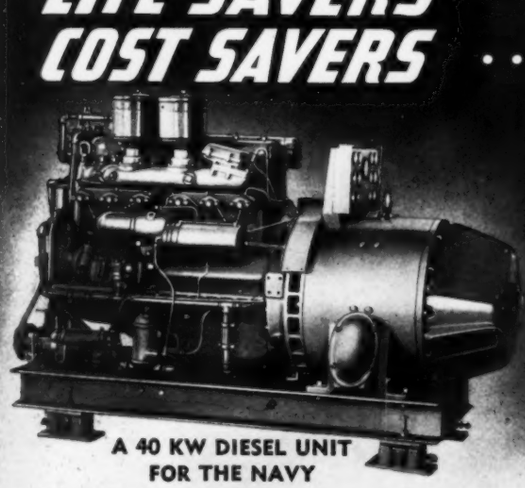


If fuel for your diesel engines were free, it would still be uneconomical to operate them without HALL-ground valves and valve seats . . . That's because maximum power and peak performance for longer periods between needed valve overhauls can only be obtained with valves and valve seats of such precision and finish as produced with the HALL Wet Type Diesel Valve Refacer and HALL ECCENTRIC Diesel Valve Seat Grinder . . . For the duration, Uncle Sam has first call on our production but it will pay you to get acquainted with HALL Equipment NOW by writing for complete information today.

The Hall Manufacturing Co.
Toledo, Ohio

HALL

LIFE SAVERS ... in War
COST SAVERS ... in Peace



A 40 KW DIESEL UNIT FOR THE NAVY

U. S. Electric Plants in service throughout the far-flung battle fronts are, literally, life savers. For, modern warfare is "run" by electricity — telephones, radios, listening devices, search lights, automatic equipment. After the war, these powerful U. S. Plants will go back to their regular job of saving power and lighting costs for industrial and commercial users.

U. S. MOTORS CORP.
OSHKOSH, WIS.

U.S. DIESEL
ELECTRIC PLANTS

New Bulletin On Flexible Metallic Tubing

TITEFLEX METAL HOSE CO. has just released a new catalogue, #113, which deals with the general industrial applications of their line of flexible metallic tubing. This catalogue describes the types of flexible tubing manufactured by The Titeflex Metal Hose Co. used in the conveyance of oils, gasses, and liquids. Complete data is given on available fittings, both industrial and S.A.E. Also included are complete pressure charts, charts showing radius of bend, and many other essential data. Many usual and unusual types of applications for flexible metal tubing are pictured and described, together with instructions for installation of the tubing. This catalogue should be particularly valuable to design engineers, power engineers, maintenance executives, and production executives in metal working and process industries. Write Titeflex Metal Hose Co., 500 Frelinghuysen Avenue, Newark, New Jersey for your copy of Bulletin #113.

Cleveland Diesel Opens Coast Service Office

THE Cleveland Diesel Engine Division of General Motors has opened (June 10) a Pacific Coast Service Office in the One Eleven Sutter Building, Suite 821-5, 111 Sutter Street, San Francisco, California. The office is in charge of Charles C. Cheevers, Service Manager. T. L. Meckbach is Office Manager.

This new office became necessary because of the greatly expanded activities of Cleveland Diesel on the West Coast. Serving as a central clearing station, the office will insure efficient handling of all service requirements of the U. S. Navy and other users of the Cleveland Diesel Engine Division's products.

Air-Maze Issues a New Bulletin on Breather Filters

AIR-MAZE Corporation has announced a new bulletin covering its line of Breather Filters for engine and compressor crankcases, gear cases, hydraulic equipment, liquid storage tanks, engine valve housings, etc. Described and illustrated are both "Oil-Wetted" and "Oil-Bath" types of breather filters suitable for application on every housing that has an air vent. The new bulletin also features the Air-Maze Open- and Closed-circuit Oil Separators. The fourth and last page of the bulletin carries an easy-reference tabulation of specifications of "Oil-Wetted" and "Oil-Bath" type Air-Maze filters. A copy of the new Air-Maze Breather Filter Bulletin will be mailed on written request to Air-Maze Corporation, 5200 Harvard Ave., Cleveland, Ohio.

FUEL INJECTION EQUIPMENT
for Installation by
DIESEL ENGINE BUILDERS
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EX-CELL-O CORPORATION
Diesel Division — Detroit Michigan
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EX-CELL-O means PRECISION

SHIPBOARD METERS

EMPIRE Meters of all sizes are furnished with special flanges integral with meter casing for shipboard use. EMPIRE Shipboard Meters are approved for use in the United States Navy by the Bureau of Engineering, Washington, D. C., and comply fully with the requirements of the U. S. Bureau of Marine Inspection and Navigation, American Bureau of Shipping, and Lloyd's Register of Shipping. The long-wearing EMPIRE Meter is especially suited to marine installation because of its exceptional ability to maintain its accuracy for long periods without adjustment or repairs. Write for Bulletin N-620.

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NATIONAL METER DIVISION
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Empire METERS

Highest Quality Gaskets & Oil Seals
by FITZGERALD
Gasket Craftsmen for 37 Years
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Gaskets of all types and materials to give reliable service under all Diesel operating conditions.
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FITZGERALD
SINCE 1896
GASKETS

Saul Dershwin Appointed Vice President and Treasurer of Price Battery Corporation

SAUL DERSHWIN, recently appointed Vice-President and Treasurer of the Price Battery Corporation, Hamburg, Pa. Mr. Dershwin has been associated with the Company since 1932, first in the capacity of Credit Manager, then as Manager of Export Sales and for the past two years as Manager of Government and Industrial Sales. The company has received many important contracts for storage batteries from the U. S. Navy, Army, Maritime Commission, Shipyards, etc.

Mr. Dershwin, who has been active in the automotive field since 1926, is widely known throughout the Industry, both in this country and abroad.

West Coast Diesel News

By JIM MEDFORD

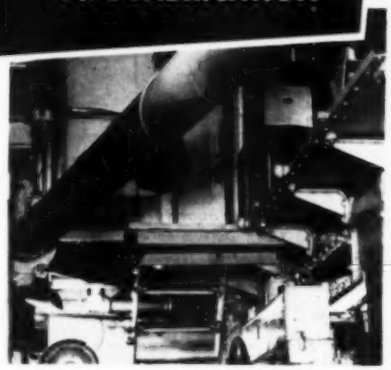
TWIN Caterpillar Diesels, six cylinder and 100 hp., have been installed in the 70-foot Van Camp Packing Co., fishing vessel *Magnolia*, Terminal Island, California.

THE Marine View Boat Building Company, Tacoma, Washington, are constructing an 82-foot tuna vessel for Medina and Marquis, San Diego, California. Main engine is a 240 hp. Washington Diesel; auxiliaries are two 50 hp. Union Diesels.

NEWPORT HARBOR, California, will have a new Diesel operated drydock. Of 2,800 tons capacity, it is being constructed by Haddock Company. The 32 Fairbanks-Morse propeller pumps will be driven by a battery of Atlas Imperial Diesel engines.

TWO marine Caterpillar Diesel installations reported by the Shepherd Tractor and Equip-

NAYLOR—
YOUR BEST BET FOR EXHAUST AND INTAKE PIPE FABRICATION



Here's a dependable source of supply for precision-fabricated exhaust and intake piping. No matter how simple or complicated your specifications are, it will pay you to consult Naylor.

Write for details
or send specifications for quotation

Naylor
NAYLOR PIPE COMPANY
1265 EAST 92nd STREET
CHICAGO, ILLINOIS

TUTHILL'S
V-BELT DRIVE
FOR VICTORY

LONG LIFE... NEGLIGIBLE MAINTENANCE IN HANDLING HEAVY LIQUIDS

From one end to the other, this compact V-belt driven viscous liquid Tuthill pumping unit is engineered for long, dependable and economical service in war-time as in peace. Quiet in operation, simple in construction, it is of the positive-displacement, internal-gear rotary type that has made Tuthill Pumps synonymous with dependability in industry. Features include outboard ball-bearing shaft support, belt tension adjustment by one set-screw, wide range of speeds, capacities and pressures, inexpensive replacements, negligible maintenance.

TUTHILL PUMPS ARE SERVING ARMY • NAVY • AIR FORCE MERCHANT MARINE

Write for Viscous Liquid Pump bulletin

TUTHILL PUMP COMPANY
939 EAST 95TH STREET • CHICAGO, ILLINOIS

DIESEL MARINE AUXILIARY UNITS

With Reserve Power

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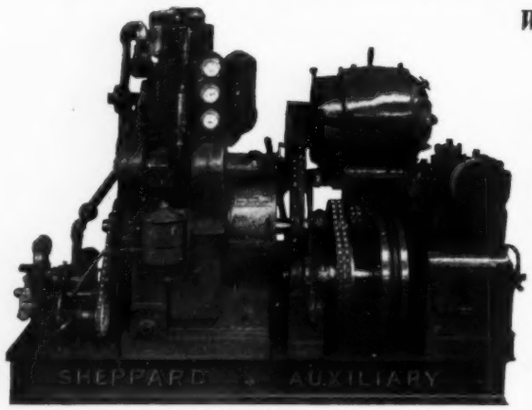

Sheppard Diesel Marine Auxiliary Units are designed and built to insure that extra power and stamina—always needed to meet the vicissitudes of weather—but doubly necessary in time of war. You can depend on Sheppard units to see your ship through again and again.

★

SHEPPARD *All American* DIESELS

Write For Particulars

R. H. SHEPPARD COMPANY

HANOVER, PENNSYLVANIA

1 to 1000

K.W. —D. C. Generators to 1000 K.W. for Engine, Direct or Belt Drive; Single or Two Bearing Type; Solid or Flexible Coupling.

A.C. Synchronous Generators to 1500 K.W.

H. P. —D. C. or A. C. Motors and Polyphase Induction Motors to 1000 H. P. to meet any special requirements.

Write for Burke recommendations.

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SINCE 1891

MANUFACTURERS OF
ALL KINDS MOLDED RUBBER
GASKETS FOR NEW ENGINES
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BUCKEYE RELINER PRODUCING CO.
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GRADE NO. 1000

A special FINE valve grinding or finishing compound recommended by Mfrs. and users of diesel engines for "lapping in" or "finishing" injector seats and injector valves. Trial can ..... $1.00 prepaid

U. S. Products Co.

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Application for Membership in the Diesel Engineers International Assn.

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Name .....
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Enclose $10.00 Entrance Fee

FOR SALE

Two-Sixty H.P. 40 K.W. 1200 RPM direct drive, Fairbanks-Morse, complete Diesel Electric plant. Can be inspected under load. Also 2-90 HP 600 RPM Krupp Modag Diesel Engines with "V" Belt drive. $900 each.

Black & White Corporation, 574 W. 130th St., New York City. UNiversity 4-4250

FOR THE OIL GASOLINE & WATER CONNECTIONS

VELLUMOID

VELLUMOID for Tough Jobs

For over 30 years, engineers have depended on VELLUMOID Gaskets for tight oil, water and gas connections where the going is tough. In sheets or ready cut gaskets.

THE VELLUMOID CO., WORCESTER, Mass. & DETROIT, Mich.

ment Co., of Los Angeles, California, are a 60-hp. engine in the 46-ft. *Linda* and a 100 hp. unit in the 60-ft *Electra,* Santa Barbara, California.

A FAIRBANKS-MORSE 450 hp., six-cylinder Diesel is being installed by the Pacific Boatbuilding Co., Tacoma, Washington, in a 96-foot seagoing tug for the U. S. Engineer Corps.

HODGSON, Greene, Haldiman of Long Beach, California, recently launched a 126-foot tug for offshore service. The main engines are two Fairbanks-Morse 600 hp. Diesels with pair of Hercules 40 hp. Diesels as auxiliaries.

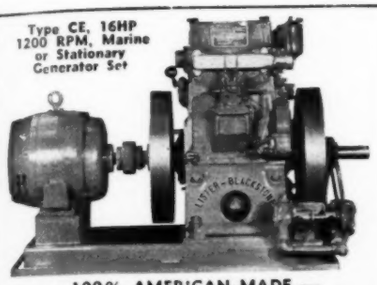
A SUPERIOR marine Diesel 5½" by 7" rated 100 hp. at 200 rpm. with Twin Disc gears has been installed by the Sebastian Stewart Machine Co., Seattle, Washington, in the 60-foot tender built for northern service.

GALICIA, the 60-foot seiner owned by the Sun Harbor Packing Co., San Diego, California, is being converted by them to hook-and-line and includes the installation of two Union Diesel auxiliaries. Main engine is a V8, 140 hp. Caterpillar marine Diesel.

HERE'S proof of a Diesel's nine lives—The 275 hp. Atlas Imperial Diesel installed in the 105-foot clipper *Santa Margarita* in 1931 after pushing this big ship over 250,000 miles is ready for another quarter-million sea miles after new liners, pistons, and general reconditioning. Her owner is the Franco-Italian Packing Corp., terminal Island, California.

VAN Camp Sea Food Company, Terminal Island, California, has purchased a pair of Cummins six-cylinder, 200 hp. at 1800 rpm. Diesels for repowering one of its 60-foot fishing vessels.

Type CE, 16HP
1200 RPM, Marine
or Stationary
Generator Set



— 100% AMERICAN-MADE —
Diesel Engines—open or enclosed. Generator Sets, marine & stationary. Combination marine auxiliaries. Portable floodlight & searchlight units.
Good Deliveries on High Priorities
Write for bulletin 150

LISTER-BLACKSTONE, INC.
MILWAUKEE, WISCONSIN

Hugh E. Anderson Appointed General Sales Manager of Honan-Crane Corp.

HUGH E. ANDERSON of the sales department of Honan-Crane Corp. has been appointed General Sales Manager for the Corporation.

Hugh E. Anderson, newly appointed General Sales Manager of Honan-Crane Corporation.

Previous to his association with the Honan-Crane Corp. Mr. Anderson has had wide experience in sales work. He was associated for many years with the Packard Motor Co. of Detroit, and more recently as Sales Manager for a leading firm of Metallurgical Engineers, and as Sales Manager for the Park Chemical Company of Detroit, Michigan.

McCORD
Class S.F.
LUBRICATORS

A modern lubricator for modern service on Diesel, gas, steam engines and compressors. Supplies dependable cylinder lubrication in metered quantities reducing friction and wear. Capacities: 2 to 24 pt. and 1 to 16 feeds. New catalog on request.

RESULT OF 40 YEARS' LUBRICATOR BUILDING EXPERIENCE

McCORD RADIATOR & MFG. CO.
DETROIT, MICHIGAN
LUBRICATOR DIVISION

Pierce Governors

Standard Equipment on the world's leading Diesel Engines!

THE PIERCE GOVERNOR COMPANY
1603 OHIO AVE., ANDERSON, INDIANA

LESS CARBON
•
LOWER EXHAUST TEMPERATURE
•
FREER VALVES
•
CLEANER RINGS
•
LONGER TIME BETWEEN OVERHAULS

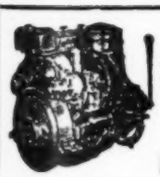
Retain these advantages with-

DIESEL FUEL *Concentrate*

• A proven additive for Diesel fuel which provides better fuel combustion and top cylinder lubrication.

Use it—5 gallons to each 1000 gallons of fuel oil—and you'll have a smoother running engine with freer valve action, less gum, lower operating temperature, and lower maintenance cost. For descriptive folder, write

E. F. HOUGHTON & CO.
PHILADELPHIA
Chicago • San Francisco • Detroit

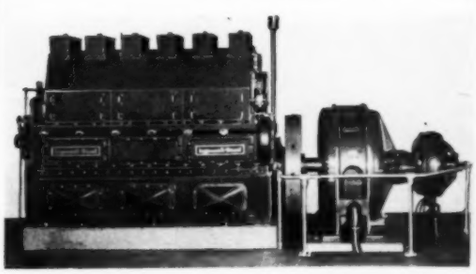


Gray Marine Diesels
Based on the Engine developed and built by General Motors, adapted and equipped for marine use by Gray.
1 to 6 cylinders, 25-165 H.P.
Both Rotations
Reduction Ratios to 4.4:1
Fresh water cooling is standard
GRAY MARINE MOTOR CO.
998 Canton Ave. Detroit, Mich.

READY FOR SHIPMENT
from present Arizona mine location

INGERSOLL-RAND
DIESEL
GENERATOR

Ingersoll-Rand, Diesel type S, 600 RPM, 343 HP at 3500 ft., 6-cylinder, direct connected to a 294 KVA generator, 480 volt, 3 phase, 60 cycle, direct connected exciter.



This and other heavy equipment from eight Arizona gold mines now being sold at Liquidator's sale.
Offers subject to prior sale and all sales made subject to WPB and OPA Regulations.

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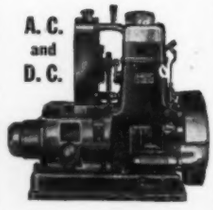

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Latest Diesel Patents

A description of the outstanding patented inventions on Diesel and Diesel accessories as they are granted by the United States Patent Office. This information will be found a handy reference for inventors, engineers, designers and production men in establishing the dates of record, as well as describing the important Diesel inventions.

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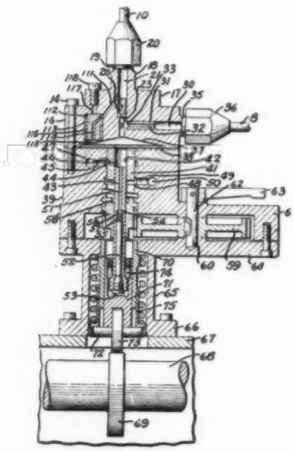
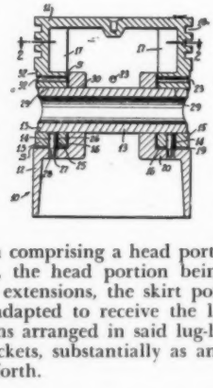
2,301,407
FUEL INJECTION PUMP
Jesse E. Houser, William A. Hancock, and Lewis T. Rowe, Dayton, Ohio, assignors to The Dayton Liquid Meter Company, Dayton, Ohio, a corporation of Ohio
Application June 22, 1940, Serial No. 341,840
12 Claims. (Cl. 103—44)

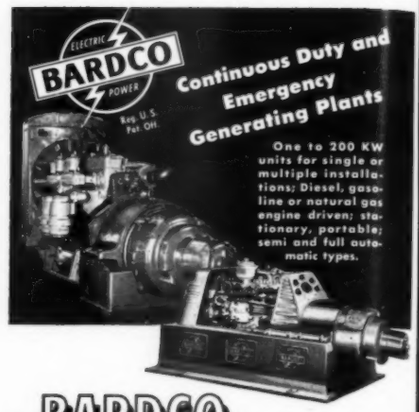


1. An injector pump for delivering measured quantities of fuel to an engine, said pump comprising an elongated compartment having one end communicating with the cylinder of the engine, and the other closed by a flexible member, a body of oil for flexing said member when placed under pressure, whereby fuel is caused to issue from the open end of said compartment, and means for maintaining the oil free of air and vapor globules, whereby said member is flexed and fuel is ejected in proportion to pressure applied to the oil, said means comprising a filter which permits oil to pass but restrains air and vapor out of solution.

2,296,478
PISTON
William F. Morgan, Chicago, Ill.
Application April 9, 1942, Serial No. 438,251
5 Claims. (Cl. 309—15)



1. A piston comprising a head portion and a skirt portion, the head portion being formed with lug-like extensions, the skirt portion having pockets adapted to receive the latter, and alignment pins arranged in said lug-like extensions and pockets, substantially as and for the purpose set forth.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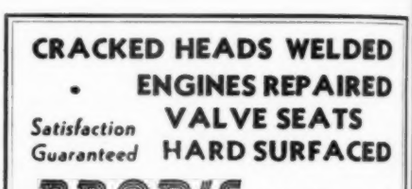

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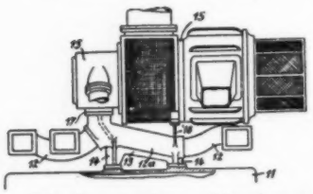
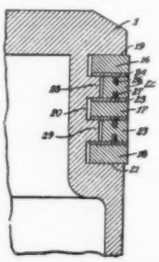
2,305,295
DIESEL ENGINE WITH CHARGING DEVICE
Richard Lang, Ravensburg, and Fritz Koch and Otto Baur, Friedrichshafen - on - the - Bodensee, Germany; vested in the Alien Property Custodian
Application October 25, 1940, Serial No. 362,862
In Germany October 28, 1939
7 Claims. (Cl. 60—13)



1. In a Diesel engine in combination: a group of engine cylinders, a charging device driven by exhaust gases from said cylinders, a conduit of pipes for said exhaust gases, said conduit being shaped to serve as a support for said charging device, said charging device at one point resting directly on and secured to said exhaust conduit, and an intermediate supporting element inserted between said conduit and said charging device for supporting said charging device at another point, said supporting element being yieldable in character so that heat tensions in the exhaust conduit are not transmitted to the charging device.

2,296,116
LAMINATED PISTON RING
Stanley M. Pelc, Greenville, Pa.
Application May 19, 1941, Serial No. 394,205
3 Claims. (Cl. 309—22)



2. A piston having a wide channel therein, outwardly extending spaced rectangular projections circumferentially carried by the bottom wall of the channel, a ring within the channel formed by the projections and of a thickness less than the width of the channel, intermediate rings of the same width as the projections, and removable plates carried by the intermediate rings on each face thereof and extending inwardly beyond the projections.

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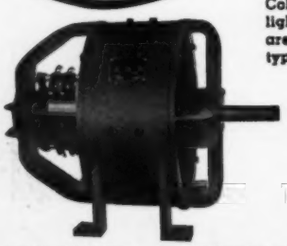

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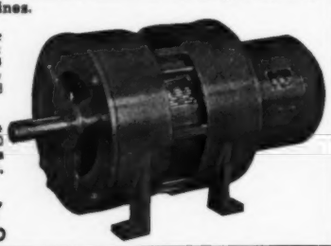
Columbia D.C. Generators range in size from 7½ to 200 KW, 36, 60, 125 and 250 volts and in speeds of 1750, 1450, 1150 and 850 R.P.M.



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